VOLUME 33 SEPTEMBER 1940 NUMBER 9

Southern Medical Journal

Journal of the Southern Medical Association

Copyright, Southern Medical Association, 1940. Published monthly by the Southern Medical Association, Empire Building, Birmingham, Alabama. Annual subscription, $4.00. Entered as Second-Class Matter at the Post Office at Birmingham, Alabama, under Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917, authorized December 20, 1921.

Southern Medical Association, Thirty-Fourth Annual Meeting, Louisville, November 12-15, 1940

TABLE OF CONTENTS

Sulfathiazole in the Treatment of Gonorrhea: A Preliminary Report. Edgar G. Ballenger, Harold P. McDonald and Reese C. Coleman, Jr., Atlanta, Georgia 911

Studies on the Epidemiology of Oxyuriasis. Willi Sawitz, Joseph S. D'Antoni, Kenneth Rhude and Sydney Lob, New Orleans, Louisiana 913

Discussed by W. H. Wright, Washington, D. C.; E. J. Sunkes, Augusta, Ga.

The Incidence of Pinworm (Enterobius Vermicularis) Infection in North Carolina. H. W. Brown, A. J. Sheldon and T. Thurston, Chapel Hill, North Carolina 922

Local Protection or Immunity with Evidences of Experimental Application. William H. Harris and Shirley Walther, New Orleans, Louisiana 925

Discussed by George S. Graham, Birmingham, Ala.; I. D. Michelson, Memphis, Tenn.; Florence Rena Sabin, Denver, Col.; Lathan A. Crandall, Memphis, Tenn.; R. H. Rigdon, Memphis, Tenn.; A. L. Joyner, New York, N. Y.

A Study of the Incidence of Air-Borne Molds and of Skin Sensitivity to Molds. Edna S. Pennington, Nashville, Tennessee 931

Discussed by Homer E. Prince, Houston, Tex.

Congenital Obstruction of the Bladder Neck. Wilmer L. Grantham and R. Carl Bunts, Asheville, North Carolina 939

Discussed by Owsley Grant, Louisville, Ky.; Russell A. Hennessey, Memphis, Tenn.

A Practical Graphic Method of Recording Leg Length Discrepancies. J. Warren White, Greenville, South Carolina 946

Discussed by John D. Sherrill, Birmingham, Ala.; Earl D. McBride, Oklahoma City, Okla.; J. Albert Key, St. Louis, Mo.; F. Walter Carruthers, Little Rock, Ark.; J. Hiram Kite, Atlanta, Ga.

Use of Ingals Gold Tube in Frontal Sinus Operations. D. H. Anthony, Memphis, Tennessee 949

Use of Pontocaine in Spinal Anesthesia: A Report Based on 1,710 Consecutive Cases. E. Bryce Robinson, Jr., Fairfield, Alabama 955

Discussed by Frank H. Bassett, Hopkinsville, Ky.; Perry P. Volpitto, Augusta, Ga.; Dougal M. Dollar, Louisville, Ky.; Louis H. Ritzhaupt, Guthrie, Okla.; Merrill C. Beck, New Orleans, La.; Eldon B. Tucker, Morgantown, W. Va.; B. C. Willis, Rocky Mount, N. C.; G. H. Bunch, Columbia, S. C.

The Prophylactic Use of Tetanus Antitoxin: An Analysis of 500 Cases. Cecil E. Newell, Chattanooga, Tennessee, and Charles McVea, Baton Rouge, Louisiana 962

Discussed by William Battle Malone, II, Memphis, Tenn.; Edward D. Mitchell, Jr., Memphis, Tenn.; Glenn D. Batten, Jackson, Tenn.

Mesenteric Vascular Occlusion: Report of a Case in which Operation Was Performed. John H. Blue and Charles R. Lafferty, Montgomery, Alabama 968

Continued on Next Page

TABLE OF CONTENTS—Continued

The Irritable Colon. Joseph W. Larimore, St. Louis, Missouri 969

Transfusion in Infants. John E. Burch, Miami, Florida 972

The Role of Vitamin K in the Etiology, Prevention and Treatment of Hypoprothrombinemia and the Hemorrhagic Diathesis of the Newly Born. W. W. Waddell, Jr., DuPont Guerry, III, and McLemore Birdsong, University, Virginia 974

Vaginal Discharge During Pregnancy. A. P. Hudgins, Charleston, West Virginia 979

Discussed by William Bush Anderson, Nashville, Tenn.; Karl John Karnaky, Houston, Texas.

The Puerperal Bladder. Walter A. Ruch, Memphis, Tennessee 986

Radiation Therapy As An Aid in the Diagnosis and Treatment of Certain Abdominal Tumors. E. A. Merritt and Ralph M. Caulk, Washington, District of Columbia 989

Discussed by Elliott M. Hendricks, Fort Lauderdale, Fla.; Walter S. Lawrence, Memphis, Tenn.; Harold G. F. Edwards, Shreveport, La.; Wright Clarkson, Petersburg, Va.; Charles L. Martin, Dallas, Tex.

Doubt: A Healthy State of Mind. W. W. Young, Atlanta, Georgia 991

Discussed by Rock Sleyster, Wauwatosa, Wis.; Frank Luton, Nashville, Tenn.; Carroll C. Turner, Memphis, Tenn.

The Physical Requirements for Entrance and the Supervision of the Health and Welfare of Students During the Medical Course. H. D. Moor, Oklahoma City, Oklahoma 995

Discussed by W. K. Keller, Louisville, Ky.; Carlo Jos. Tripoli, New Orleans, La.

The Hospital's Responsibility for Training of Interns and Residents. F. R. Bradley, St. Louis, Missouri 1000

Discussed by Carlo Jos. Tripoli, New Orleans, La.; Stuart P. Cromer, Little Rock, Ark.; Isidore Cohn, New Orleans, La.

Publicity's Place in the Public Health Program. John M. Gibson, Montgomery, Alabama 1003

EDITORIALS 1007

The Louisville Meeting
Hugh Young
Poliomyelitis in Feces
Determining Viability of the Fetus
Twenty-Five Years Ago

BOOK REVIEWS 1010

SOUTHERN MEDICAL NEWS 1014

WILDER'S
CLINICAL DIABETES MELLITUS AND HYPERINSULINISM

By RUSSELL M. WILDER, M.D., Ph.D., F.A.C.P., Professor and Chief of the Department of Medicine, the Mayo Foundation; Head of Section on Metabolism Therapy, the Mayo Clinic, Rochester. Octavo of 459 pages, illustrated. Cloth, $6.00.

All those many things that Dr. Wilder has learned through a quarter century of first-hand experience are included in this **new book.** More than that, these facts are organized and so presented as to give you quickly and easily the very information that will prove most helpful to you in managing diabetic cases. **Every accepted treatment is included,** with full details of when and how to administer it. **Actual diets and menus** are given both for children and adults. Fully half of the book deals with **complications,** stressing those that most frequently occur. Every doctor owes it to himself and to his diabetic patient to have this new book.

SEND ORDERS TO

New Orleans **J. A. MAJORS COMPANY** Dallas

PACKED WITH PRACTICAL SOLUTIONS TO *YOUR* ORTHOPEDIC PROBLEMS

"HANDBOOK OF ORTHOPEDIC SURGERY"

by Alfred R. Shands

"OPERATIVE ORTHOPEDICS"

by Willis C. Campbell

The 2nd Edition of Shands' "Handbook of Orthopedic Surgery" presents the fundamental facts and principles of orthopedic surgery in as concise a manner as possible, yet is sufficiently detailed. The book is in no way the opinion of one man or one trend of thought emanating from one clinic. It is a consensus of opinion drawn from the criticisms and suggestions of more than 25 outstanding orthopedic surgeons and teachers, representing 18 different medical schools.

The subject matter of the text is divided into 24 chapters, 16 of which are arranged on the basis of pathology and seven according to anatomical region, including disease entities which do not fall readily into the pathology grouping. Illustrations are especially helpful. They were drawn especially for this book and aid immeasurably in diagnosis and treatment.

By ALFRED RIVES SHANDS. 541 pages, 154 illustrations. Price $4.25.

"Operative Orthopedics," reviewers say, not only meets the current need and demand for a comprehensive work on operative orthopedics, but in clear, well-defined, and step-by-step pictures explains the best procedures to follow in the treatment of orthopedic affections. Eight hundred and forty-five splendid illustrations make this book outstanding in its field.

In the first chapter of Campbell's book the mechanical, surgical, and physiologic principles of orthopedic practice are correlated, and throughout the book the practical application of these principles is emphasized. Besides complete coverage on actual treatment, this volume gives you a special chapter on surgical technic, another on apparatus, another on surgical approaches. These chapters are referred to again and again throughout the book and after treatment is given in detail for practically all operative procedures.

By WILLIS C. CAMPBELL. 1154 pages, 845 illustrations, 4 color plates. Price, $12.50.

The C. V. Mosby Company
3525 Pine Blvd., St. Louis, Mo.

SMJ-9-40

Gentlemen: Send me ( ) Shands' "Orthopedic Surgery" priced at $4.25
( ) Campbell's "Operative Orthopedics" priced at $12.50

Dr._____

Address_____

AT THE A. M. A. MEETINGS

IN NEW YORK . . .

Doctors confirm the value of B-Complex

Dr. W. H. Sebrell (Washington, D. C.) stated at the June 11th meeting, at Hotel Waldorf, that deficiency is often of the multiple type or polyphased, and such diagnosis is difficult for the physician and successful treatment requires a variety of vitamins. He also stressed the importance of the mineral portion of the deficient diet. It is well known that certain vitamins do not complete their function except in presence of proper mineral salts.

Dr. Tom D. Spies (Cincinnati) stated that he recognized as many as *eleven deficiencies* and his graphic illustration of the *complex problem* for the physician, was astounding.

Bottles of 50, 500, 1000.

BREWERS' YEAST (HARRIS)

in powder form and its concentrates—

contains Vitamins B_1-B_2-B_4-B_6 and nicotinic acid with the *mineral yeast cell* salts, essential for certain vitamins to complete their therapeutic purposes.

Be Sure—Use "B-complex" as advised by Williams and Spies,* who state:

Even when vitamins B_1, B_2, B_6 and nicotinic acid are all combined, "it cannot fulfill the entire function of the vitamin B-complex."

●

Crystalline Vitamins B_1-B_2-B_6-C and nicotinic acid are offered in tablets of convenient sizes.

*"Vitamin B_1", 1938, p. 133

THE HARRIS LABORATORIES

TUCKAHOE NEW YORK

SINCE 1919

FOUNDERS of VITAMINS for MEDICAL USE

TO SUPPLEMENT INJECTIONS

GIVE MALE SEX HORMONE VIA PERCUTANEOUS ABSORPTION

Neo-Hombreol Dosules are sealed gelatin capsules, manufactured exclusively by us, containing an accurately measured quantity of Neo-Hombreol (testosterone propionate 'Roche-Organon') in a rapidly absorbable ointment base. Thus, for the first time is it possible in a practical way to administer this potent substance by inunction, free from the obvious danger of overdosage inherent in the use of bulk ointments packaged without measurement control of the individual dose. Each Neo-Hombreol Dosule contains 2 grams of ointment representing 4 milligrams of chemically pure synthetic testosterone propionate. Packages of 25.

NEO-HOMBREOL DOSULES

♂ Male climacteric, hypogonadism, and cryptorchidism; experimentally, in impotence and incipient prostatism.

♀ Premenstrual mastopathia, female climacteric, dysmenorrhea, and menorrhagia.

ROCHE-ORGANON, INC. • NUTLEY • N. J.
IN CANADA: ROCHE-ORGANON LTD. • MONTREAL • TORONTO

Enduring Character

Sixty-four years—time to train succeeding crops of young men in Lilly traditions—time to establish a solid foundation on a policy that is strikingly like the Golden Rule.

EXTRALIN

(LIVER-STOMACH CONCENTRATE, LILLY)

'Extralin' provides the antipernicious-anemia principle in a highly concentrated form for oral use. With 'Extralin' the blood count may be maintained at normal levels with the least amount of inconvenience to the patient. Nine to twelve pulvules daily constitute an average maintenance dose.

ELI LILLY AND COMPANY

PRINCIPAL OFFICES AND LABORATORIES • INDIANAPOLIS, INDIANA, U. S. A.

Thyloquinone in Oil

(Squibb 2-Methyl-1, 4-Naphthoquinone)

Unsurpassed in **VITAMIN K** *activity*

It has been shown that vitamin K-active compounds have a definite practical importance in the prevention and control of certain hemorrhagic states caused by a lowered prothrombin content of the blood associated with vitamin K deficiency.

Under the auspices of The Squibb Institute for Medical Research, Thyloquinone has been investigated extensively as regards its chemical, physical, biologic and pharmacologic properties, and its clinical actions, uses, limitations and toxicity. These studies[1,2,3,4,5,6] and others, demonstrate clearly the remarkable vitamin K activity of this compound, show it to be powerfully prothrombinogenic, and to have a favorable therapeutic index.

Thyloquinone is more rapidly utilized than natural prothrombinogenic vitamin K_1 or K_2, and is more potent—i.e. it is effective in smaller dosage than either K_1 or K_2. Its appreciably lower cost increases its field of usefulness. It is indicated in conditions where the blood has a subnormal prothrombin content because of vitamin K deficiency such as obstructive jaundice, biliary fistula, hemorrhagic disease of the newborn and certain hepatic and intestinal derangements.

Two Forms for Oral Administration

Thyloquinone in Oil in 5 cc., 10 cc., and 50 cc. vials, each 1 cc. of corn oil containing 1 mg. Thyloquinone.

Thyloquinone in Oil in Microcaps, representing 1 mg. Thyloquinone in corn oil, individually sanitaped, in boxes of 20, 50 and 100. "Microcap" is the Squibb trade-marked name for miniature, precision-filled gelatin capsules.

[1] Ansbacher, S., and Fernholz, E.: *J. Am. Chem. Soc.*, 61:1924, 1939.
[2] Ansbacher, S.; Fernholz, E.; and MacPhillamy, H. B.: *Proc. Soc. Exper. Biol. & Med.* 42:655, 1939.
[3] Ansbacher, S., and Fernholz, E.: *Science* 90:215, 1939.
[4] Ansbacher, S.; Fernholz, E.; and Dolliver, M. A.: *Proc. Soc. Exper. Biol. & Med.* 43:652, 1940.
[5] Rhoads, J. E., and Fliegelman, M. T.: *J. A. M. A.* 114:400, 1940.
[6] Andrus, W. DeW., and Lord, J. W., Jr.: *J. A. M. A.* 114:1336, 1940.

For literature address the Professional Service Department, 745 Fifth Ave., New York, N. Y.

E·R·SQUIBB & SONS, NEW YORK
MANUFACTURING CHEMISTS TO THE MEDICAL PROFESSION SINCE 1858

Are You FEEDING a Suitable FAT?

Yes, Some Fats Do Upset Them. Yet a proper fat is an essential part of every infant's diet. The addition of carbohydrate cannot compensate for the absence of a sufficient amount of a suitable fat.

SMA fat resembles human milk fat—has the same chemical and physical characteristics. And because SMA fat is like human milk fat the SMA carbohydrate is lactose, the only sugar present in human milk.

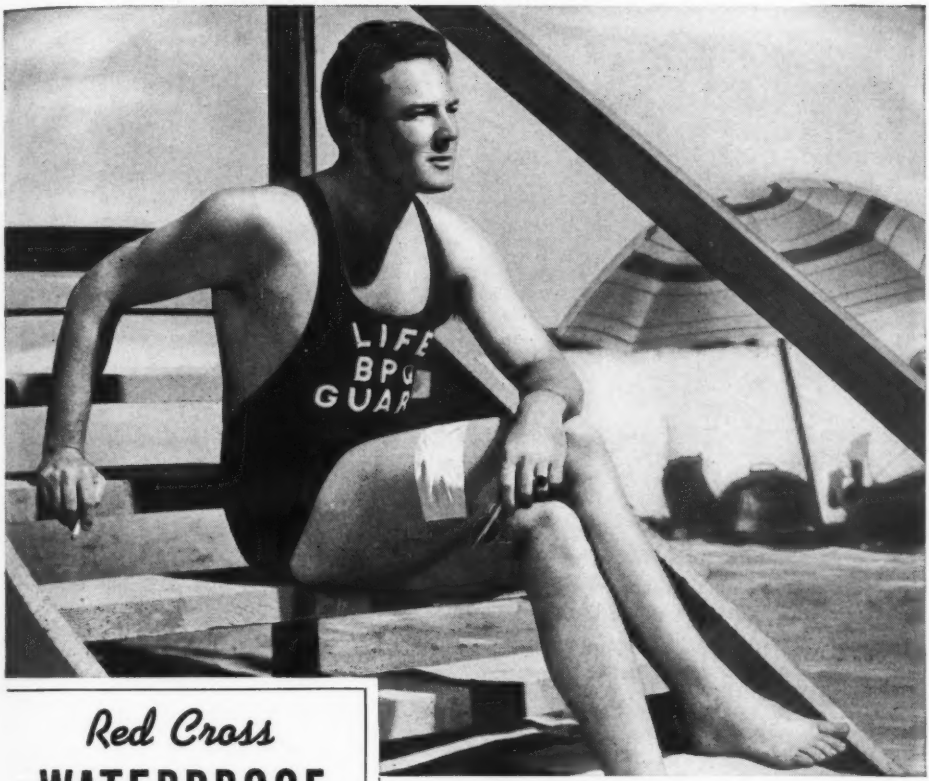
The percentages of fat, protein, carbohydrate and ash are the same as those in human milk and when prepared according to the physician's directions SMA is essentially similar to human milk.

Therefore, SMA may be fed to normal full-term infants without modification or change for the same reason that it is not necessary to modify human milk.

Normal infants relish SMA—digest it easily and thrive on it.

S.M.A. CORPORATION • 8100 McCORMICK BOULEVARD • CHICAGO, ILL.

Protection from Moisture



Red Cross
WATERPROOF ADHESIVE

● Active patients whose injuries require dressings will appreciate your use of Red Cross Waterproof Adhesive. The edges of the waterproof back cloth do not turn up after washing. Red Cross Waterproof Adhesive is pliable, tears evenly, and is easy to apply. Supplied on spools and in 12″ cut rolls.

ORDER FROM YOUR DEALER

Johnson & Johnson
NEW BRUNSWICK, N. J. CHICAGO, ILL.

COPYRIGHT 1940, JOHNSON & JOHNSON

SULFATHIAZOLE-WINTHROP

Another important chapter
IN ANTIBACTERIAL CHEMOTHERAPY!

● **The new sulfonamide derivative—Sulfathiazole—constitutes an additional triumph of chemotherapeutic research which will prove of great value to clinical medicine.**

Numerous cases of pneumococcus pneumonia and of staphylococcus septicemia have responded with dramatic promptness to the curative action of this thiazole analogue of sulfapyridine. Sulfathiazole is usually administered in doses that are essentially the same as those of sulfapyridine, but it is more uniformly absorbed and has less tendency to cause serious nausea or vomiting.

Sulfathiazole is effective also against other pathogenic organisms, but its general clinical application in such infections should await the published reports on various investigations still in progress.

Write for literature which discusses the indications, dosage and possible side effects of Sulfathiazole.

Specify **SULFATHIAZOLE-WINTHROP**

HOW SUPPLIED: Sulfathiazole-Winthrop is supplied in tablets of 0.5 Gram (7.72 grains), bottles of 50, 100 and 500; also *(primarily for children)* in tablets of 0.25 Gram (3.86 grains), bottles of 50, 100 and 500.

For preparing test solutions, Sulfathiazole-Winthrop is available in bottles of 5 Grams.

WINTHROP

Circular containing detailed information is enclosed in each package.

WINTHROP CHEMICAL COMPANY, INC.
Pharmaceuticals of merit for the physician **NEW YORK, N. Y. • WINDSOR, ONT.**

743aM

FLEXIBLY—CONVENIENTLY—ECONOMICALLY *Packaged*

ANOTHER RESPONSIBILITY OF LEADERSHIP

WHEN Baxter began to supply Parenteral Solutions in VACOLITERS, only the Liter size was provided. Soon it became apparent that a Half Liter—a Double Liter—would sometimes prove convenient and economical.

To supply a wide range of solutions in new sizes meant additional filling machinery, records, inventories of cartons, labels, and price lists; and greatly increased stock inventories at all warehousing points. From the beginning, however, Baxter has recognized its responsibility to provide whatever the best interests of the profession may indicate.

However broad the requirements, hospitals may specify Baxter Parenteral Dextrose and Saline Solutions with assurance not only of wide variety and highest quality, but also of packaging in containers of all needed sizes—containers which in every case are complete VACOLITERS (approved by the American College of Surgeons) *with their exclusive visible index of vacuum.*

IN developing its now widely accepted new technique for aseptic indirect Blood Transfusion, Baxter has been guided by these same considerations of convenience and economy in use.

With the Baxter TRANSFUSO-VAC, Drawing the Blood, Citrating, Transporting, Storing, Filtering and Infusing are all accomplished in and from a single vacuum container, bridging both time and space without break in asepsis. Procedure is almost automatic in its convenience, enabling one operator to perform the entire sequence with remarkable economy of time and effort, and without wasting a drop of blood. Citrate* contents are supplied in three quantities—for 250, 500 and 750 cc. of Blood. Accessory sets are provided for every important requirement.

For the average hospital, the safe rule is to stock two more TRANSFUSO-DONOR SETS *than the maximum number of blood transfusions per day.*

On request, professional bulletins discussing: Parenteral Solutions in VACOLITERS, TRANSFUSO-VAC Blood Transfusion Sets.

*2½ Sodium Citrate in Physiological Solution of Sodium Chloride in the Baxter TRANSFUSO-VAC Container.

PRODUCTS OF
BAXTER LABORATORIES

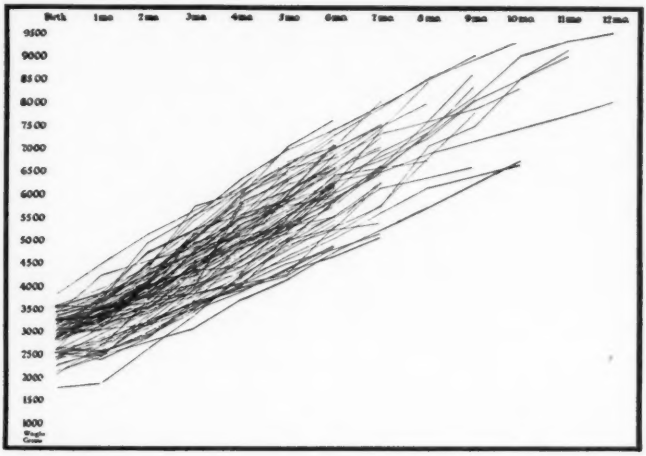
Glenview, Ill.; College Point, N. Y.; Glendale, Cal.; Toronto, Canada; London, England
Produced and distributed on the Pacific Coast by Don Baxter, Inc.: Glendale, Cal.

One of a Series on the Progress of Intravenous Infusion and Blood Transfusion.

Distributed East of the Rockies by

CHICAGO • AMERICAN • NEW YORK
HOSPITAL SUPPLY CORPORATION

Uniformly Good Results



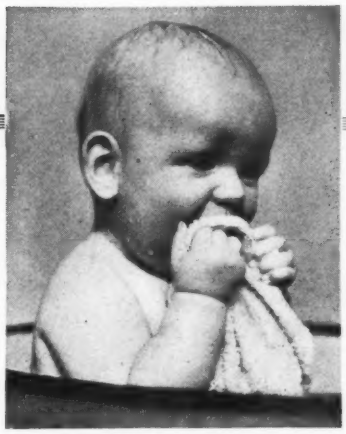
75 Consecutive Cases Fed on Similac

These weight curves represent the progress of consecutive infants fed on Similac for six months or longer at a well known hospital. Notice the low initial loss, the rapid return to birth weight, and the consistent gain thereafter. There was not a single instance of gastro-intestinal upset in the group. Name of hospital on request.

Made from fresh skim milk (casein modified) with added lactose, salts, milk fat, and vegetable and cod liver oils

SIMILAC } SIMILAR TO BREAST MILK

M&R DIETETIC LABORATORIES, INC. • COLUMBUS, OHIO



EVAPORATED MILK IN ALLERGY

"Evaporated milk is definitely less allergenic than unheated milk.... If cow's milk must be fed [in eczema], evaporated milk is probably the best form.... Evaporated milk will give results in the overwhelming majority of cases, providing other factors are not responsible.... Just use heated evaporated milk and then concentrate on the other factors . . . *Q.* What is the difference between evaporated milk and whole milk boiled ten minutes? *A.* The lactalbumin is not sufficiently coagulated in the latter."—Round Table Discussion on Food Allergy in Children, Ninth Annual Meeting, American Academy of Pediatrics; J. Pediat., May, 1940.

FREQUENT references to evaporated milk in the discussion quoted above give added evidence of its value in the infant dietary. . . . Physicians are invited to write for "Simplified Infant Feeding," an authoritative discussion of the use, in normal and difficult feeding cases, of Irradiated Carnation Milk, an evaporated milk accepted as meeting high standards of quality and uniformity. . . . *Carnation Company, Milwaukee, Wis.; Toronto, Ont.*

Irradiated
CARNATION MILK
"From Contented Cows"

AMPHOJEL *Wyeth's Alumina Gel..*

RELIEVES NIGHT PAIN IN PEPTIC ULCER PATIENTS

The administration of one-half ounce of AMPHOJEL immediately before retiring usually eliminates night pain in peptic ulcer patients. AMPHOJEL controls free HCl. The patients rest more comfortably and sleep more soundly.

In addition to this symptomatic relief, AMPHOJEL permits rapid healing of the ulcer without danger of producing alkalosis.

AMPHOJEL
Wyeth's Alumina Gel
Available in 12-oz. Bottles

AMPHOJEL TABLETS
For the convenience of the ambulatory patient

Each tablet contains 10 grains of aluminum hydrate and represents the antacid effect of about two teaspoonfuls of fluid AMPHOJEL.

AMPHOJEL TABLETS are indicated in simple hyperacidity and may be used as a supplement to fluid AMPHOJEL

Supplied in boxes of 60 tablets

JOHN WYETH & BROTHER, INCORPORATED, PHILADELPHIA

FOR PREGNANCY CONSTIPATION

℞ Mucilose (Stearns)

REGULATIVE . . .
NON-IRRITATING .
NON-HABIT-FORMING

SPASTIC colon and constipation—particularly during pregnancy—contraindicate harsh, irritating roughage or violent laxation. Mucilose unites the fecal material into a soft, mushy mass and facilitates its passage by lubricating both the intestinal tract and its content.

Mucilose offers a hemicellulose (vegetable gum) prepared by a special process from the Plantago loeflingii.

For relief of colic or spasm

CYVERINE HYDROCHLORIDE

Relaxes smooth muscle

•

Inhibits peristalsis

•

An effective vaso-dilator

FREDERICK STEARNS & COMPANY
DETROIT, MICHIGAN

NEW YORK KANSAS CITY SAN FRANCISCO
WINDSOR, ONTARIO SYDNEY, AUSTRALIA

FREDERICK STEARNS & COMPANY Dept. SM-9
Detroit, Michigan
Please send me a clinical supply of ☐ Mucilose Granules ☐ Cyverine

*Name*_____ *M.D.*

*Address*_____

*City*_____ *State*_____

STUDIES IN THE AVITAMINOSES

This page is the ninth of a series on vitamin deficiencies presented by the research division of The Upjohn Company because of the profession's widespread interest in the subject. A full color, two-page insert on the same subject appears in the August 17 issue of The Journal of the American Medical Association.

Casal's collar in a patient with advanced pellagra secondary to chronic alcoholism.

Illustration courtesy of Virgil P. W. Sydenstricker, M.D., University of Georgia Medical School, Augusta.

The scaling symmetrical pellagrous dermatitis of the hands.

The Dermatitis of Pellagra

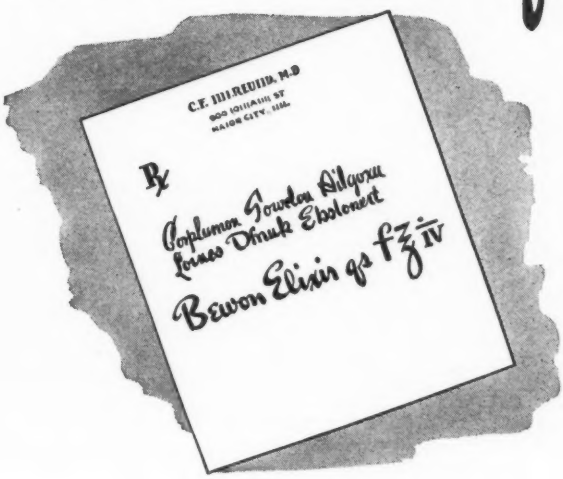
The severe scaling dermatitis of the hands seen in most cases of advanced pellagra is pathologically identical with skin lesions developing elsewhere on the body surface. Microscopically, thickening of the skin, lymphocytic infiltration of the dermis, and hyaline degeneration of the intima of the smaller arterioles are observed. The early clinical changes consist of burning, tenderness, erythema, pigmentation, and mild vesiculation. The acute character of the eruption disappears after a variable period but if no treatment is instituted, the pigmentation becomes more intense and the scaling and desquamation more severe. As with other pellagrous skin lesions, the dermatitis of the hands is bilateral and symmetrical, and is sharply demarcated from the adjacent normal skin.

The dermatitis which frequently appears on the neck is known as Casal's collar. The lesion assumes its peculiar distribution because of the provocative action of sunlight upon the skin of pellagrins. The neck, exposed to the influence of sunlight, is thus frequently the site of the pellagrous dermatitis. However, unexposed portions of the skin, notably the upper thighs and perineum, may become similarly involved.

UPJOHN

℞ *Wyeth's*

Bewon Elixir q.s.



WYETH'S BEWON ELIXIR serves as an excellent solvent and vehicle for many medicaments. Compatible with most drugs, **BEWON ELIXIR** contains 19% alcohol and is slightly acid in reaction.

Standardized to contain 500 International Units of Vitamin B_1 (thiamin chloride) **BEWON ELIXIR** stimulates the appetite and is indicated in Vitamin B_1 deficiencies.

●

A Vehicle that Stimulates the Appetite

SUPPLIED IN PINT AND GALLON BOTTLES

JOHN WYETH & BROTHER, INCORPORATED, PHILADELPHIA, PA.

THE EVIDENCE to be found in numerous published reports demonstrates that Atabrine dihydrochloride materially shortens the road to recovery from malaria. In the majority of cases chemotherapy with this agent involves a remarkably brief period, generally only five days. Usually, acute paroxysms disappear within a day or two and parasites are no longer demonstrable in the blood after one short course of treatment.

The significance of such results is obvious. Not only are patients incapacitated for a very short time but the rapid eradication of parasites largely prevents anemia, splenomegaly and other chronic complications of malaria.

Write for illustrated booklet.

ATABRINE

Reg. U. S. Pat. Off. & Canada

Brand of CHINACRIN

DIHYDROCHLORIDE

Methoxychlordiethylaminopentylamino-acridine dihydrochloride

Chemotherapeutic Specific Against Malaria

Never Advertised to the Public

IMPORTANT NOTICE

Contrary to representations in the scientific and lay press, Atabrine is manufactured here by a company which is not controlled from overseas. The productive capacity is more than ample for present requirements, and can be expanded quickly. Our resourceful and experienced chemists make Atabrine routinely and are ready for any emergency.

WINTHROP CHEMICAL COMPANY, INC.

Pharmaceuticals of merit for the physician • NEW YORK, N. Y. • WINDSOR, ONT.

744M

Back to School---

★ ★ Petrolagar

Back to school again and a life of lessened activity that is likely to influence normal bowel habits. During this period of readjustment, consider the use of Petrolagar Plain.

Petrolagar is gentle, but thorough and may be prescribed for all ages as an aid to restoration of normal bowel habits. Most children cooperate willingly because Petrolagar is exceptionally palatable and easy to take just as it is, or in milk, water or fruit juices.

Petrolagar . . . Liquid petrolatum 65 cc. emulsified with 0.4 Gm. agar in a menstruum to make 100 cc.

Petrolagar Laboratories, Inc. - 8134 McCormick Boulevard - Chicago, Illinois

AN E.N.T. TREATMENT ROOM IN A SMALL AREA

The dimensions in the above photograph are 5′ 9″ along one wall and 4′ 2″ along the other. In this area, conveniently arranged, is everything needed to make a complete ear, nose and throat examination. The complete absence of piping and wiring is especially noticeable. We wish to call attention to the new cuspidor which is now combined with the suction.

Treatment Cabinet: Covered with stainless steel, with casting of a non-corroding aluminum alloy. Contains: air regulator with gauge, tubing, cutoff and air filter; nasopharyngoscope rheostat; push button; cautery transformer and rheostat; transilluminator complete with rheostat, cord, handle, lamps, antrum and frontal tips; seven metal drawers on fiber runners and one large drawer for towels; waste container; bakelite covered work table; space for six spray bottles, twelve solution bottles, shelf for cotton jars; pocket for history card or prescription blanks; and a spray bottle heater; the whole presents an attractive appearance and will not tarnish and is easy to keep clean. $125.00. Can be furnished without air or electrical equipment for $75.00. (Glassware not included.)

Chair: Can be placed in horizontal position, will not tip in this position; raised and lowered by large hand wheel; paper covered headrest removable; locked with foot-pedal; bakelite armrests removable. Removable footrest and handle and chair can be used as a modified turning chair; back locks rigidly in any position. As shown in brown, $75.00. Turning Chair: By adding a footrest and the necessary handles the chair can be used for turning tests. All additional equipment is easily and quickly removable. Add $25.00.

Combined Suction and Cuspidor: This is an entirely new piece of equipment. It was designed to eliminate the cost of installing a separate suction. The apparatus is 12″ wide and projects 13¼″ from the wall. The flushing rim and the suction is furnished with a vacuum breaker and should meet all plumbing requirements. Complete with trap and valves in green and ivory. $59.50. Extra charge for other colors. Original cuspidor is still being manufactured, being furnished with vacuum breaker. $34.50.

Ceiling Light: A telescopic light attached to the ceiling; for 4 or 5′ lengths (when extended). $10.50. Other lengths available.

Light Shield: Takes an ordinary 60 watt lamp. Will not burst; spot can easily be rotated. $5.00.

Stool: A soft upholstered stool with easy running ball bearing stem casters. $12.50.

Treatment Cabinet for Ophthalmologists: This is similar to the cabinet above except that a thermostatically controlled warming cabinet is included. This cabinet is placed at the level shown for the top shelf. The heater is left on continuously and the setting of the thermostat can be easily changed. This cabinet is slightly higher than that shown in the cut. There is a charge of $25.00 for this addition.

SURGICAL — MECHANICAL — RESEARCH

1901-1903 Beverly Boulevard **Los Angeles, California**

"One of the Soundest Investments We Ever Made"

THIS is substantially the verdict of hundreds of tumor clinics when asked to summarize their experience with G-E Maximar equipment for high-voltage therapy.

They have found that the Maximar's consistently reliable performance helps them to maintain full treatment schedules; that its practical design and unusual flexibility make it easy to handle, with maximum patient comfort; that its simplified, positive controls insure accuracy of dosage; and that operation is at a relatively low cost of maintenance.

Wherever you may be located in the United States or Canada, there's a G-E Branch conveniently near, manned by factory-trained men who will see to it that your Maximar experience is just as gratifying as that of several hundred other users in all parts of the world.

To equip adequately for x-ray therapy involves a sizable investment, and the best assurance that your investment in a G-E Maximar will ultimately prove thoroughly sound is its unusually high degree of efficiency and reliability.

Let us help you plan for a modern x-ray therapy service that will merit added prestige for your institution.

A39

GENERAL ELECTRIC

X-RAY CORPORATION

2012 JACKSON BLVD. CHICAGO, ILL., U. S. A.

*Hematinic Plastules**

ECONOMICAL IRON THERAPY

● Here's one iron preparation that is effective and *economical* too! The cost of treatment with Hematinic **Plastules** is only a few cents per day, yet results in most cases are superior to those obtained with other forms of iron.

A written prescription for HEMATINIC **PLASTULES** assures the patient every benefit of modern iron therapy at a very nominal expense.

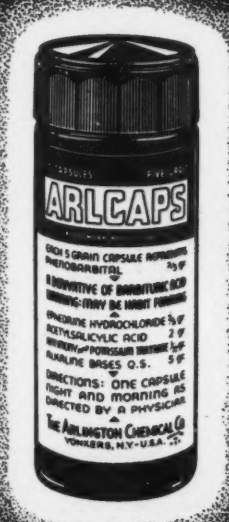
℞ Hematinic **Plastules** Plain or Hematinic **Plastules** with Liver Concentrate for the treatment of secondary anemia
Available in bottles of 50's and 100's

THE BOVININE COMPANY
8134 McCormick Boulevard • Chicago, Illinois

*"Plastules"—Reg. U. S. Pat. Off.

MODERN IRON THERAPY

FOR HAY FEVER



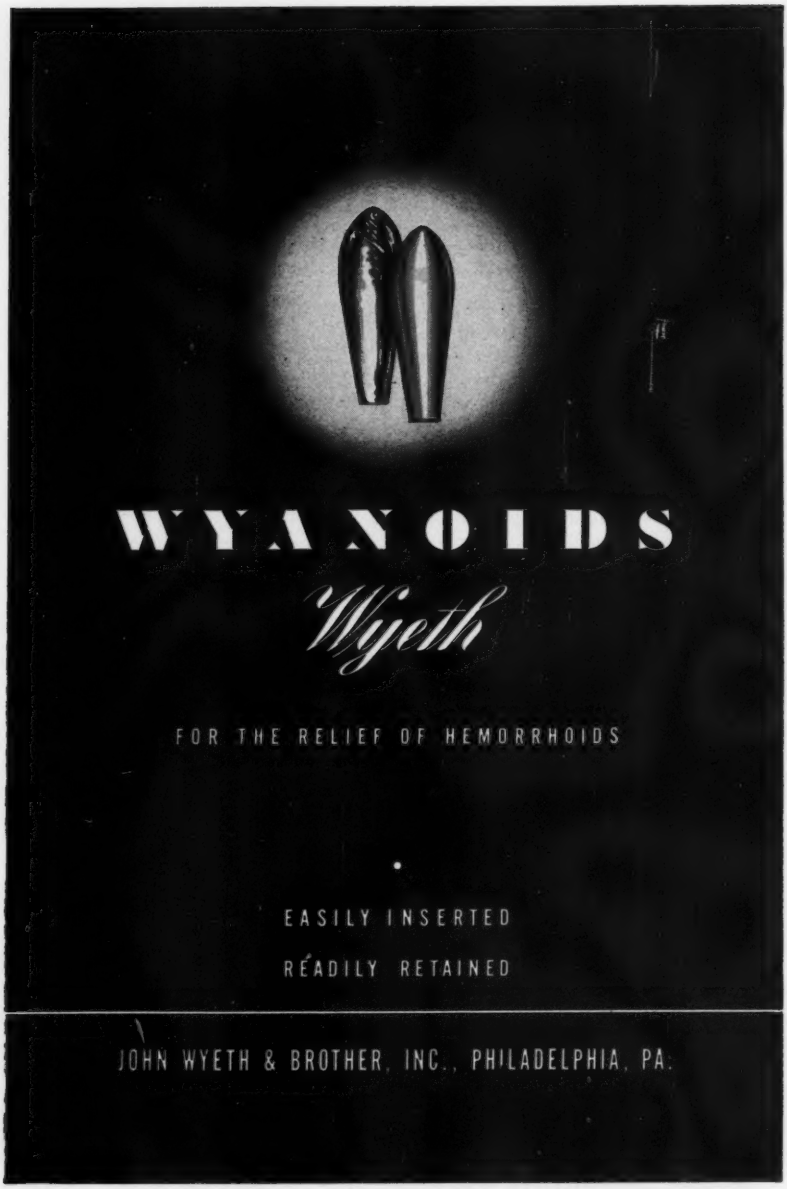
DRAMATIC SYMPTOMATIC RELIEF IN MOST CASES THROUGH THE CONCERTED *LOCAL and SYSTEMIC ACTION* OF A SYNERGETIC COMBINATION OF DRUGS

CONTROLLED tests and wide clinical experience have demonstrated the unusual subjective relief that Arlcaps can give many patients receiving, or being prepared to receive, specific treatment. Its combined sedative, analgetic and vasoconstrictive action usually helps effectively to dry nasal secretions . . . decrease nasal blocking . . . abate wheezing spells . . . and subdue the spasmodic coughing following an acute bronchial attack. Arlcaps' balanced formula of phenobarbital, acetylsalicylic acid, ephedrine hydrochloride, and alkaline bases, has proved far more successful in most cases than ephedrine alone. Write for samples.

Available: In bottles of 25 5-gr. capsules for adults, and 35 3-gr. capsules for children; also in dispensing bottles of 500 capsules each. *Dosage:* one capsule night and morning, as directed by a physician.

THE ARLINGTON CHEMICAL CO., YONKERS, N. Y.

ARLCAPS


WYANOIDS
Wyeth
FOR THE RELIEF OF HEMORRHOIDS
EASILY INSERTED
READILY RETAINED
JOHN WYETH & BROTHER, INC., PHILADELPHIA, PA.

Treat next winter's colds *Now*

Clinical Tests Show Catarrhal Oravax
Reduces Severity and Duration

Now is the time to begin vaccination of your patients who need protection from colds. Those who cannot afford expensive injections or will not take the time, and those who are needle-shy or fear painful reactions, can have *clinically tested* protection by *oral* vaccination with

CATARRHAL ORAVAX

MERRELL

Catarrhal Oravax is an improved catarrhal vaccine in enteric coated tablets. Each tablet contains 50,000 million killed organisms:

Pneumococci (D. pneumoniae) Types I, II and III	12,500 million
Micrococcus (Neisseria) catarrhalis	10,000 million
Influenza bacillus (H. influenzae)	10,000 million
Streptococci (mixed)	7,500 million
Friedlander bacillus (K. pneumoniae)	5,000 million
Staphylococcus aureus	2,500 million
Staphylococcus albus	2,500 million

CLINICALLY TESTED. Controlled clinical tests have shown repeatedly that Catarrhal Oravax will reduce illness due to colds. In a recent study (Journal-Lancet *60*:319-325; 1940), *number* and *duration* of *severe* colds in vaccinated group was only *one-fifth* that in control group receiving placebos.

BEGIN VACCINATION EARLY. For best results, begin vaccination early enough to establish adequate protection before colds become prevalent. Latest work indicates that seven to ten weeks may be required for protection to develop.

Recommended dosage is 1 tablet daily for 7 days; then 1 tablet twice weekly throughout "colds season." Bottles of 20 and 100, at prescription pharmacies.

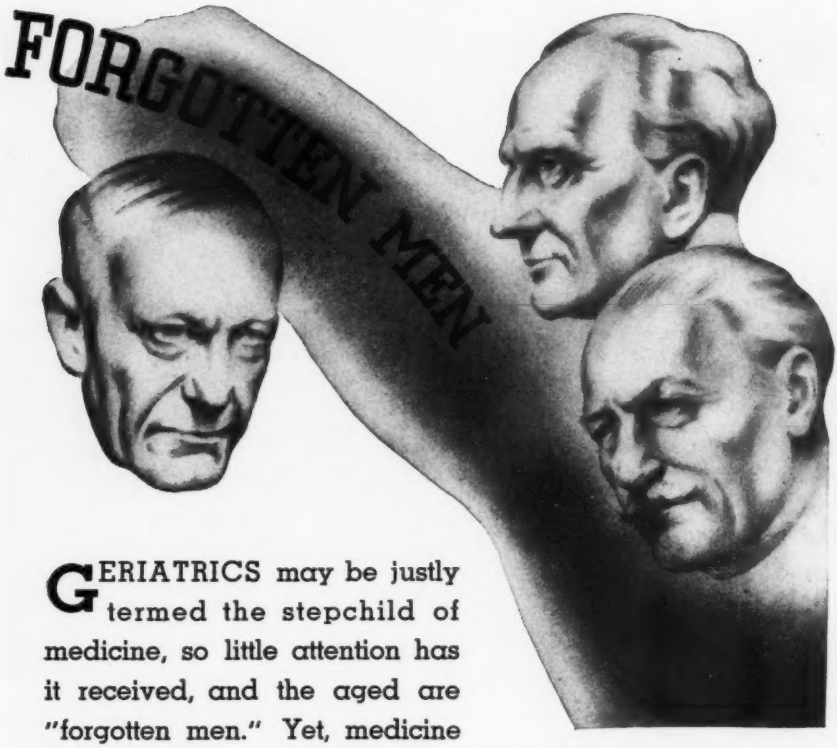
THE WM. S. MERRELL COMPANY
Lockland Station, Cincinnati, Ohio

Please send Catarrhal Oravax sample, literature, and reprint of new clinical study.

Dr......

Address..... S.M.-9

City.....*State*.....



GERIATRICS may be justly termed the stepchild of medicine, so little attention has it received, and the aged are "forgotten men." Yet, medicine can provide much comfort to ease the infirmities of old age, among which constipation is almost ever present. You will find, as many physicians have already found, that Agarol is the preparation well-suited to the treatment of the obstinate constipation of advanced years. The contents of the colon are softened by unabsorbable moisture, evacuation is made easy and painless and devoid of dangerous straining. Such action is, of course, desirable not only in the aged, but in every age group. Agarol is gentle enough for the young child, yet in proper dosage active enough for the adult. ¶ A trial supply of Agarol will be gladly sent to you. It is supplied in bottles of 6, 10 and 16 ounces.

WILLIAM R. WARNER & CO., INC.

113 WEST 18th STREET - - NEW YORK CITY

FEWER INJECTIONS

for Prolonged Estrogenic Therapy

Adequate estrogenic effects by means of fewer injections are desirable for many patients requiring treatment for long periods of time. Because of the prolonged effect, per milligram or fraction thereof, of this estrogenic substance, DI-OVOCYLIN* (the dipropionic acid ester of α-estradiol) is therapeutically effective with injections at longer intervals. It thus affords greater convenience, economy, and comfort to your patients.

In many cases of menopausal syndrome, senile vaginitis, pruritus vulvae, genital infantilism, and dysmenorrhea and amenorrhea associated with uterine hypoplasia, Di-Ovocylin, *"Ciba"* is the therapy of choice. For short periods of treatment or when dosage is to be altered frequently, Ben-Ovocylin,* *"Ciba"* (α-estradiol benzoate) may be injected, or Ovocylin,* *"Ciba"* (α-estradiol) administered intravaginally, by inunction, or orally.

LITERATURE ON REQUEST

* Trade Mark Reg. U. S. Pat. Off. Words "Di-Ovocylin," "Ben-Ovocylin," and "Ovocylin" identify the products as α-estradiol dipropionate, α-estradiol benzoate, and α-estradiol respectively of Ciba's manufacture.

DI-OVOCYLIN

THE ESTROGENIC SUBSTANCE WITH PROLONGED EFFECT

CIBA PHARMACEUTICAL PRODUCTS, INC.

SUMMIT • NEW JERSEY

C · I · B · A

THE WORLD IS WHETTED TO A FINICKY ACUTENESS

ANALYTIC CONTROL LABORATORY OF WM. P. POYTHRESS & COMPANY, INC.

THE modern pharmaceutical laboratory balance weighs to 1/10,000 gram.

The modern electrical potentiometer for pH determination will detect the presence of 1/1,000,000 gram of hydrogen ions in a solution. Its sensitivity is several hundred times that of litmus paper or phenolphthalein.

Through the use of these and other instruments of similar accuracy and sensitiveness in the control laboratory, a precision undreamed of several decades ago is now achieved in pharmaceutical manufacture.

•

Manufacturers of

SOLFOTON • URO-PHOSPHATE • TCS • PANALGESIC

WILLIAM P. Poythress & CO. INC.
RICHMOND, VIRGINIA

SINCE 1856

How to check Diarrhea!

WITH *Wyeth's* KAOMAGMA

AT THE ONSET OF DIARRHEA . . .

Administer two tablespoonfuls of Kaomagma Plain, in a little water—and follow this with one tablespoonful of Kaomagma Plain, after every bowel movement . . . then when stools become consolidated one tablespoonful of Kaomagma with Mineral Oil three times daily may be indicated.

KAOMAGMA

- Coats and protects the irritated mucosa, acting as a mild astringent.
- Precipitates and coagulates bacterial suspensions.
- Adsorbs and renders innocuous toxic and irritant substances in the intestines.

Kaomagma Plain and Kaomagma with Mineral Oil are supplied in 12-oz. bottles.

JOHN WYETH & BROTHER, INCORPORATED, PHILADELPHIA

Grace Lutheran Sanatorium For Tuberculosis

A Beauty Spot on Prospect Hill

701 South Zarzamora Street
SAN ANTONIO, TEXAS

JAMES L. ANDERSON, M.D., Medical Director

Admits patients irrespective of denomination or creed.

Ideal all year climate.—Excellent medical and nursing care.—Radiographic, Fluoroscopic and Pneumothorax service.

New, distinctive, Individual **Bungalows**, highly modern, and **Private Rooms** with baths and sleeping porches, all equipped with radio.—Beautiful grounds.

Moderate rates.

For booklet and information address:

PAUL F. HEIN, D.D.
Pastor and Superintendent

For Patients With Alcoholic Problems

--*The Farm*

A non-institutional arrangement in Howard County, Maryland, for the individual psychological rehabilitation of a limited number of selected voluntary patients with ALCOHOL problems — both male and female — under the psychiatric direction of

Robert V. Seliger, M.D.

CITY OFFICE:

2030 Park Avenue, Baltimore, Md.

Laboratory and X-Ray Course

IS NOW TEN MONTHS IN DURATION

Supplemented by Six Months' Practical Work in a Hospital Laboratory, comprising 16 months in all.

COURSE INCLUDES:

Clinical Pathology
Bacteriology
Blood and Urine Chemistry
Hematology
Tissue Sections, Frozen and Paraffin
Serology
Parasitology
Basal Metabolism
Electrocardiography
Roentgenology

A corps of experienced teachers plus completely equipped teaching laboratories covering 3100 square feet.

Write for new catalogue (1940)

Gradwohl School of Laboratory and X-Ray Technique

3514 Lucas Avenue, St. Louis, Missouri
R. B. H. Gradwohl, M.D., Director

TULANE UNIVERSITY OF LOUISIANA

SCHOOL OF MEDICINE

CLINICS

During the week October 7 to 12, 1940, clinics will be given daily. Registration $5.00.

For program and other information, write

DIRECTOR
DEPARTMENT OF GRADUATE MEDICINE

1430 Tulane Avenue, New Orleans, La.

THE TUCKER
SANATORIUM, INC.

212 West Franklin St. (Corner of Madison)

RICHMOND, VIRGINIA

This is a private Sanatorium for the Neurological Practice of Drs. Beverley R. Tucker, Howard R. Masters and James Asa Shield.

The Tucker Sanatorium is for the treatment of nervous and endocrine diseases. There are departments of massage, medicinal exercises, hydrotherapy and physiotherapy. The Sanatorium is large and bright, surrounded by a lawn and shady walks, large verandas and has a roof garden. It is situated in the best part of Richmond and is thoroughly and modernly equipped. The nurses are specially trained in the care of nervous cases.

St. Elizabeth's Hospital
Richmond, Virginia

STAFF

J. Shelton Horsley, M.D., Surgery and Gynecology
John S. Horsley, Jr., M.D., Plastic and General Surgery
Guy W. Horsley, M.D., General Surgery and Proctology
Douglas G. Chapman, M.D., Internal Medicine
Wm. H. Higgins, M.D., Consultant in Internal Medicine
Austin I. Dodson, M.D., Urology
Charles M. Nelson, M.D., Urology
Fred M. Hodges, M.D., Roentgenology
L. O. Snead, M.D., Roentgenology
R. A. Berger, M.D., Roentgenology
Helen Lorraine, Medical Illustration

Visiting Staff

Harry J. Warthen, Jr., M.D., Surgery
W. K. Dix, M.D., Internal Medicine
James P. Baker, Jr., M.D., Internal Medicine
Marshall P. Gordon, Jr., M.D., Urology
Howell F. Shannon, D.M.D., Dental Surgery

Administration

N. E. PATE, Business Manager

The operating rooms and all of the front bedrooms are completely air-conditioned.

School of Nursing

The School of Nursing is affiliated with Johns Hopkins Hospital School of Nursing in Baltimore for a three months' course each in Pediatrics and Obstetrics.

Address: Director of Nursing Education

THE TURNER - GOTTEN SANATORIUM

MEMPHIS, TENNESSEE, Route 6, Box 288

For the Diagnosis and Treatment of Mental and Nervous Disorders

Located on the Raleigh-La Grange Road, five miles east of the city limits. Accessible to U.S. 70 (the Bristol Highway). 53½ acres of wooded land and rolling fields. Equipment new and modern, including the latest equipment for physical and hydrotherapy. Special emphasis is laid upon occupational and recreational therapy under the supervision of a trained therapist. An adequate nursing personnel gives individual attention to each patient.

C. C. TURNER, B.S., M.D., Neuropsychiatrist **NICHOLAS GOTTEN, M.D., F.A.C.S., Neurosurgeon**

Alcoholism
Senility
Drug Addiction

A Modern Ethical Sanatorium at Louisville

Founded 1904

Mental
and
Nervous Diseases

BEAUTIFUL AND SPACIOUS GROUNDS AFFORD OUTDOOR RELAXATION

Our **ALCOHOLIC** treatment destroys the craving, restores the appetite and sleep, and rebuilds the physical and nervous condition of the patients. Liquors withdrawn gradually; no limit on the amount necessary to prevent or relieve delirium.

MENTAL patients have every comfort that their home affords.

The **DRUG** treatment is one of gradual reduction; it relieves the constipation, restores the appetite and sleep; withdrawal pains are absent. No Hyoscine or rapid withdrawal methods used unless patient desires same.

NERVOUS patients are accepted by us for observation and diagnosis, as well as treatment.

Select Cases of SENILITY accepted. **Physiotherapy—Clinical Laboratory—X-Ray** **Consulting Physicians**

Rates and folder on request

THE STOKES HOSPITAL

Telephones
Highland 2101-2102

E. W. STOKES, M.D., Medical Director, 923 Cherokee Road, Louisville, Ky.

Hoye's Sanitarium

"In the Mountains of Meridian"

MERIDIAN, MISS.

Diagnosis and Treatment of Nervous and Mental Diseases, Alcoholic and Drug Addictions. Especially equipped for the Treatment of Mental Disorders. Convalescents, Elderly People and those requiring METRAZOL THERAPY given special monthly rates. Personal supervision of patients. Consulting physicians.

Dr. M. J. L. Hoye, Supt.

Formerly sixteen years Superintendent of East Mississippi State Hospital

Saint Albans Sanatorium

RADFORD, VA.

A modern, ethical institution, fully equipped for the diagnosis, care and treatment of nervous and mental diseases and selected addiction cases. 2,000 feet elevation. Rates reasonable. Occupational and Hydrotherapy Departments.

J. C. KING, M.D. **JAMES KING, M.D.**
FRANK A. STRICKLER, M.D.

ALLEN'S INVALID HOME

Established 1890 **MILLEDGEVILLE, GA.**

For the treatment of

NERVOUS AND MENTAL DISEASES

Grounds 600 Acres — Buildings Brick, Fireproof — Comfortable — Convenient — Site High and Healthful

E. W. ALLEN, M.D., Department for Men
H. D. ALLEN, M.D., Department for Women

Terms Reasonable

DR. MOODY'S SANITARIUM

SAN ANTONIO, TEXAS

315 Brackenridge Avenue **Phone: Fannin 5522**

For Nervous and Mental Diseases, Drug and Alcohol Addiction and Nervous Invalids Needing Rest and Recuperation

Established 1903. Strictly ethical. Location delightful summer and winter. Approved diagnostic and therapeutic methods. Seven buildings, each with separate lawns, each featuring a small separate sanitarium, affording wholesome restfulness and recreation, in doors and out doors, tactful nursing and homelike comforts.

G. H. MOODY, M.D.
Founder

J. A. McINTOSH, M.D., F.A.C.P.
Superintendent

Dr. Brawner's Sanitarium

SMYRNA, GEORGIA
(Suburb of Atlanta)

● *For Nervous and Mental Disorders Drug and Alcohol Addictions*

Approved diagnostic and therapeutic methods. Hydrotherapy, Electrotherapy, Massage, X-Ray and Laboratory.

Special Department for General Invalids and Senile Cases at Monthly Rates.

JAMES N. BRAWNER, M.D., Medical Supt.
ALBERT F. BRAWNER, M.D., Resident Supt.

APPALACHIAN HALL

Asheville, North Carolina

An Institution
FOR
Rest,
Convalescence,
the diagnosis and treatment of
NERVOUS
AND
MENTAL
DISORDERS,
ALCOHOL
AND
Drug Habituation

Appalachian Hall is located in Asheville, North Carolina. Asheville justly claims an unexcelled all year round climate for health and comfort. All natural curative agents are used, such as physiotherapy, occupational therapy, outdoor sports, horseback riding, etc. Five beautiful golf courses are available to patients. Ample facilities for classification of patients. Rooms single or en suite with every comfort and convenience.

For rates and further information write
Appalachian Hall, Asheville, N. C.

WM. RAY GRIFFIN, M.D. M. A. GRIFFIN, M.D.

McGUIRE CLINIC

ST. LUKE'S HOSPITAL

Richmond, Virginia

. . . Medical and Surgical Staff . . .

General Medicine:
James H. Smith, M.D.
Hunter H. McGuire, M.D.
Margaret Nolting, M.D.
John P. Lynch, M.D.

Orthopedic Surgery:
William T. Graham, M.D.
J. T. Tucker, M.D.

General Surgery:
Stuart McGuire, M.D.
W. Lowndes Peple, M.D.
W. P. Barnes, M.D.
Philip W. Oden, M.D.

Pathology and Radiology:
J. H. Scherer, M.D.

Roentgenology:
J. L. Tabb, M.D.
C. D. Smith, M.D.

Obstetrics:
H. Hudnall Ware, Jr., M.D.
H. C. Spalding, M.D.

Urology:
Austin I. Dodson, M.D.
Chas. M. Nelson, M.D.

Eye, Ear, Nose and Throat:
F. H. Lee, M.D.

Dental Surgery:
John Bell Williams, D.D.S.
Guy R. Harrison, D.D.S.

WESTBROOK SANATORIUM

Richmond *Virginia*

TELEPHONE 5-3245

Department for Men:
J. K. Hall, M.D.

Associates:
O. B. Darden, M.D.
E. H. Alderman, M.D.
E. H. Williams, M.D.
Rex Blankenship, M.D.

Department for Women:
P. V. Anderson, M.D.

The institution is situated just beyond the northern border of the city on United States Highway Number 1.

The scope of the work of the Sanatorium is limited to the diagnosis and the treatment of nervous and mental disorders and to the addictions to drugs and to alcohol. It affords also adequate facilities for rest and upbuilding under medical and nursing supervision.

The medical staff devotes its entire attention to the patients in the Sanatorium.

The institution maintains a school for trained attendants in which instruction in the care of the nervous and mentally sick is emphasized.

There are twelve separate buildings for patients, with 150 beds. Such a large group of buildings makes possible the more congenial grouping of patients. Rooms may be had single or en suite, with or without private bath. There are a few small cottages for the use of individual patients.

A comprehensive general physical and nervous examination is made of each patient. A mental examination is made when indicated. The examination is typed and a copy of it is available for the referring physician. Complete dental investigation is a part of the general survey.

A skilled teacher gives practical daily instruction to small groups in the arts and crafts. Helpful and interesting occupation in the out-of-doors is made possible for the men patients in the vegetable and flower gardens, on the truck farm, in the poultry yards, and in the dairy.

There are bowling, tennis, croquet and pool. On Sunday evening there is chapel service.

Detailed information is available for physicians.

STUART CIRCLE HOSPITAL

413-21 Stuart Circle

RICHMOND, VIRGINIA

Medicine:
ALEXANDER G. BROWN, JR., M.D.
OSBORNE O. ASHWORTH, M.D.
MANFRED CALL, III, M.D.
M. MORRIS PINCKNEY, M.D.
ALEXANDER G. BROWN, III, M.D.

Obstetrics:
GREER BAUGHMAN, M.D.
BEN H. GRAY, M.D.
WM. DURWOOD SUGGS, M.D.
SPOTSWOOD ROBINS, M.D.

Ophthalmology, Otolaryngology:
CLIFTON M. MILLER, M.D.
W. L. MASON, M.D.

Pediatrics:
ALGIE S. HURT, M.D.
CHAS. PRESTON MANGUM, M.D.

Surgery:
CHARLES R. ROBINS, M.D.
STUART N. MICHAUX, M.D.
ROBERT C. BRYAN, M.D.
A. STEPHENS GRAHAM, M.D.
CHARLES R. ROBINS, JR., M.D.

Urological Surgery:
FRANK POLE, M.D.
MARSHAL P. GORDON, JR., M.D.

Oral Surgery:
GUY R. HARRISON, D.D.S.

Pathology:
REGENA BECK, M.D.

Roentgenology and Radiology:
FRED M. HODGES, M.D.
L. O. SNEAD, M.D.
R. A. BERGER, M.D.

Physiotherapy
ELSA LANGE, B.S., Technician
MARGARET CORBIN, B.S., Technician

Medical Illustrator
DOROTHY BOOTH

Detailed information furnished physicians.

CHARLOTTE PFEIFFER, R.N. Superintendent

CITY VIEW SANITARIUM

For MENTAL and NERVOUS DISEASES and ADDICTIONS

Established in 1907

AN ENTIRELY NEW PLANT ERECTED IN 1922

Separate buildings for men and women, ideally arranged and equipped with every facility for the comfort, care, and treatment of the class of patients received.

It is upon the character of service rendered, rather than upon physical facilities that the reputation of such an institution must rest, and to give every patient the maximum of individual attention and unremitting care at all times is the basic principle of our work. An efficient organization exists in all departments. There is maintained an abundantly sufficient staff of capable nurses, divided into day and night shifts, assuring to every patient constant service through each of the twenty-four hours of the day. At midnight this service is as real as at midday.

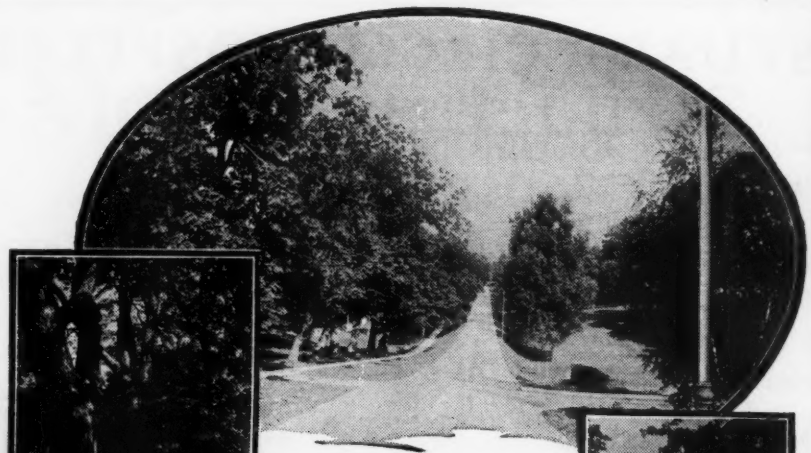
Situated in the midst of a fifty-acre tract and surrounded by a large grove and attractive lawns.

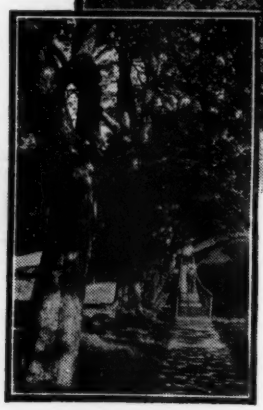
JOHN W. STEVENS, M.D. Founder

WILL CAMP, M.D. Medical Director

NASHVILLE R. F. D. No. 1 TENNESSEE

Reference: The Medical Profession of Nashville





The

Cincinnati Sanitarium

Inc. 1873

For Mental and Nervous Diseases

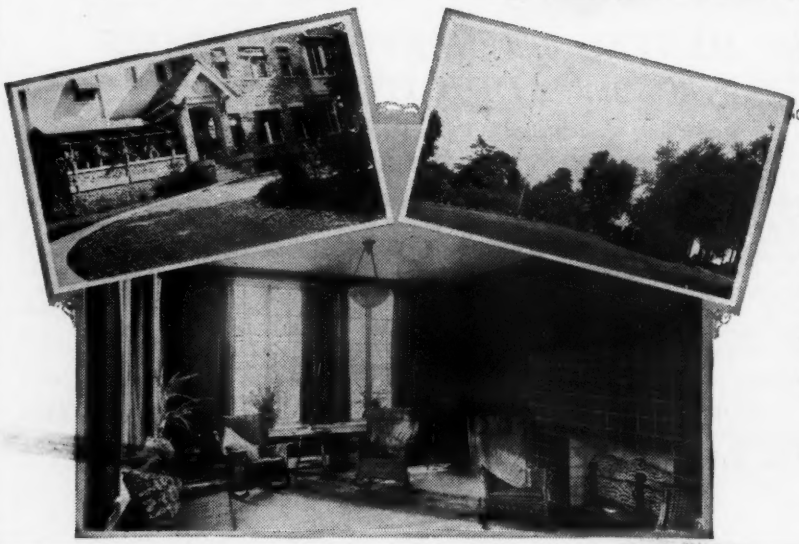
A strictly modern hospital fully equipped for the scientific treatment of nervous and mental affections. Situation retired and accessible. For details write for descriptive pamphlet.

Emerson A. North, M.D.
Charles Kiely, M.D.
Visiting Consultants

D. A. Johnston, M.D.
Medical Director

H. P. COLLINS, Business Manager
Box No. 4, College Hill
CINCINNATI, OHIO

"REST COTTAGE" College Hill, Cincinnati, Ohio



For purely nervous cases, nutritional errors and convalescents.

Completely equipped for hydrotherapy, massages, etc.

Cuisine to meet individual needs.

Emerson A. North, M.D.
Charles Kiely, M.D.
Visiting Consultants

D. A. Johnston, M.D., Medical Director

H. P. Collins, Bus. Mgr., Box No. 4, College Hill, Cincinnati, Ohio

HILL CREST SANITARIUM

FOR NERVOUS AND MENTAL DISEASES AND ADDICTIONS

Metrazol and Insulin Therapy used in Selected Cases. Gradual Reduction Method used in the Treatment of Addictions

Established in 1925

Thoroughly modern in architecture and construction. Eight departments—affording proper classification of patients. All outside rooms attractively furnished. Several bathrooms and rooms with private bath on each floor. Also a spacious sun parlor in each department. Located on the crest of Higdon Hill, 1050 feet above sea level, overlooking the city, and surrounded by an expanse of beautiful woodland. Ample provision made for diversion and helpful occupation. Adequate night and day nursing service maintained.

JAMES A. BECTON, M.D., Physician-in-Charge

P. O. Box 2896, Woodlawn Station, Birmingham, Ala. **Phones 9-1151 and 9-1152**

References: Medical profession of Birmingham and Birmingham Chamber of Commerce.

LEONARD D. WRIGHT, M.D.
Medical Director

WALTER R. WALLACE
Business Manager

MEMPHIS **THE WALLACE SANITARIUM** **TENNESSEE**

For over thirty years in successful operation; just eight miles from the heart of the city, in a quiet suburb, occupying sixteen acres of beautiful grounds, this Sanitarium is especially equipped for the treatment of drug addiction, alcoholism, nervous, and mental disorders, the care of patients requiring metrazol and insulin therapy and is ideal for convalescents.

Prevent Infection

Outdoor activities at this season cause many minor injuries for which physicians require an antiseptic.

MERCUROCHROME, H. W. & D., satisfies your antiseptic requirements. Tablets or powder provide convenient means of preparing stock solutions. Solutions do not deteriorate, providing for economy in use.

Mercurochrome, 2% aqueous solution, is antiseptic, non-irritating and non-toxic in wounds. It has a background of nineteen years of clinical use.

A comprehensive medical booklet supplying complete information about Mercurochrome (dibrom-oxymercuri-fluorescein-sodium) will be sent to physicians on request.

Mercurochrome. H.W.&D.
(dibrom-oxymercuri-fluorescein-sodium)

ACCEPTED AMERICAN MEDICAL ASSN

Every "H. W. & D." product is investigated and proved chemically, bacteriologically and pharmacologically in our laboratories before marketing.

HYNSON, WESTCOTT & DUNNING, INC.
Baltimore, Maryland

How much nourishment in a decimal point?

IT ISN'T HARD to reproduce to several decimal points a cow's milk modification that resembles breast milk in *composition.*

But . . . for true *nutritional* resemblance, compensation must be made for the *biological* differences between cow's milk and breast milk.

And the major differences *are* compensated for in Dryco modifications. For one thing, protein content is high because of the biological difference between the protein of cow's milk and the protein of breast milk.

So Dryco modifications provide ample protein throughout the nursing period. And—*just as in breast milk*—Dryco feedings supply highest protein values during early months when growth is fastest and protein need accordingly greatest.

For more than 20 years, Dryco has been clinically proved successful in infant feeding.

DRYCO
A PRODUCT OF THE BORDEN COMPANY

SOUTHERN MEDICAL JOURNAL
JOURNAL OF THE SOUTHERN MEDICAL ASSOCIATION
PUBLISHED MONTHLY BY THE SOUTHERN MEDICAL ASSOCIATION AT BIRMINGHAM, ALA.
Volume 33 SEPTEMBER 1940 Number 9

SULFATHIAZOLE IN THE TREATMENT OF GONORRHEA*

A PRELIMINARY REPORT

By EDGAR G. BALLENGER, M.D.
HAROLD P. MCDONALD, M.D.
and
REESE C. COLEMAN, JR., M.D.
Atlanta, Georgia

That sulfanilamide and its derivatives have proven to be most valuable additions to our therapeutic armamentarium must be accepted without dispute. However, it is now quite generally recognized that the compounds available have definite chemotherapeutic limitations. Further, the administration of such active compounds may lead to the precipitation of certain toxic by-effects which may range from mild nausea to severe neutropenia. Neither time nor space allows reference to the already existing voluminous data published concerning the efficiency and toxicity of sulfonamides since their introduction into chemotherapeutics five short years ago.

Accepting the frailties of sulfanilamide as a challenge, the chemist has prepared thousands of sulfonamide compounds in an attempt to produce a more satisfactory therapeutic agent. Roughly, these derivatives fall into one of three general chemical classes:

(1) Modification of the *amide* group
(2) Modification of the *amino* group
(3) Sulfone type compounds

For the past year we have engaged ourselves in the clinical evaluation of a few of those compounds in which the parent substance has been modified through a substitution in the amide group (Class 1). In this series we have studied the following five derivatives with particular reference to their value in the treatment of urologic infection:

(A) N^4-Sulfanilyl sulfanilamide
(B) N^4-Sulfanilyl N^1N^1 dimethyl sulfanilamide
(C) 2-Sulfanilamido methyl thiazole
(D) 2-Sulfanilamido thiazole
(E) 2-Sulfanilamido pyridine.

The clinical testing of the first three, listed as (A), (B) and (C) compounds, was discontinued because of the possibility of the development of peripheral neuritis. Compound (C) gave excellent clinical results, but the reported incidence of paralytic neuritis, according to the manufacturers, was in the neighborhood of 1 per cent. Such toxicity, of course, precludes the use of these compounds.

Our experiences with sulfathiazole (D) and sulfapyridine (E) have been encouraging. Although sulfathiazole and sulfapyridine are both effective against the staphylococcus, the former is decidedly the drug of choice. In addition, sulfathiazole has been shown to be of value in the treatment of infection due to Streptococcus fecalis, a property which in so far as we know is not common to any other sulfonamide compound. Both derivatives are capable of producing urinary concretions because of the insolubility of their acetyl derivatives. We have not encountered clinical evidence of kidney or bladder stone in the patients we have treated. However, we have seen urines which would lead us to consider the patient a likely candidate if medication were continued. As regards gastric tolerance, very few of our patients complained of sulfathiazole, while nausea and vomiting were observed in about 20 per cent of our sulfapyridine patients. It was interesting that patients who complained of being intolerant to other sulfonamides were able to ingest sulfathiazole without difficulty. This is an important advantage of sulfathiazole over the pyridine de-

*Received for publication July 6, 1940.
*The sulfathiazole used by us was supplied through the courtesy of the Research Department of the Winthrop Chemical Co.

rivatives of sulfanilamide. It should be remembered, however, that large doses have been continued for short periods only.

CLINICAL RESULTS

Soon after the report of Carroll and his associates of their experiences with sulfamethylthiazole in the treatment of staphylococcic infections at the 1939 meeting of the Southern Medical Association we obtained a supply of sulfathiazole. We administered this product cautiously to patients who were unable to tolerate adequate doses of sulfanilamide as well as to patients with infections which were known to be resistant.

As our investigations proceeded it was observed that nearly all patients could ingest adequate doses without toxic reactions sufficiently disturbing to cause its discontinuance.

It was observed also that gonococcal infections which had been resistant to sulfanilamide often responded promptly to sulfathiazole. Patients who had first taken sulfanilamide or sulfapyridine were almost unanimous in their praise of sulfathiazole. Its use was naturally extended to the usual genito-urinary infections. This present report, however, is limited to our experiences with the use of sulfathiazole in the treatment of gonorrhea.

The chief trouble experienced at first was in the somewhat limited supply of sulfathiazole available. Patients who were started with it usually were dissatisfied if the supply became exhausted and other chemicals had to be employed before they were well.

Duration of the infection and previous treatment led to the following classification:

(A) Patients who came for treatment within the first two days after the urethral discharge appeared.

(B) Patients with acute infections who reported after the discharge had been present for longer than two days.

(C) Patients in whom sulfanilamide was not effective.

(D) Patients who could not tolerate sulfanilamide because of its disturbing reactions.

(E) Patients who could not tolerate sulfapyridine.

For the patients in Group A, those in whom the discharge had not been present for more than two days, 20 minims of a freshly made silver protein solution was sealed in the anterior urethra once daily for 4 days. The intake of fluids was restricted so that the argyrol could be retained in the urethra for 4 hours at each treatment. Eighty grains of sulfathiazole were given daily for the first two days. For the next two days the dose was reduced to 60 grains daily. The sulfathiazole was given after meals and at bedtime. After the fourth day, all treatment was discontinued in order to determine at once if the infection had been eradicated.

In the group treated by this plan there were five. All obtained an immediate cure. By this we mean that the discharge disappeared after the first day, and the patient was well after the fourth treatment. The usual tests for cure were made in each case and the patient carefully followed for a period of four weeks.

These results in beginning infection will be misleading unless it is borne in mind that the not generally used plan of sealing silver protein in the urethra was employed in all of them. Similar good results have followed this procedure when sulfanilamide and sulfapyridine were used. In this group of patients the chemotherapeutic advantages of sulfathiazole were not so obvious as was its better tolerance by the patients.

In Group B with infections of more than two days' duration there were 40. With them routine treatment with injections and irrigations were employed to supplement the use of sulfathiazole, the dose of which was about 40 grains a day. In those without complications the discharge usually disappeared within 2 to 4 days. The last glass of urine not infrequently became clear about the third day. The first glass as a rule became clear within 6 to 7 days. Shreds often persisted for about a week, sometimes two weeks, sometimes longer. The average time required for the patients in this group without urethral strictures, prostatitis, or epididymitis was 12 days. In the group with complications the average time was 21 days.

There were 8 patients in Group C without complications who failed to respond to sulfanilamide. These patients, like those in whom the acute infection had subsided before sulfathiazole was started, usually yielded with promptness. The average time required for them was 14 days.

In Group D, those unable to tolerate sulfanilamide, there were 3. In none of them was sul-

fathiazole sufficiently disturbing to require its discontinuance and the time necessary to effect a cure averaged 12 days.

In Group E, those unable to take sulfapyridine, there were 3. All were able to take adequate doses of sulfathiazole. The average duration of their treatment was 12 days.

REACTIONS

The toxic reactions from sulfathiazole were about like the mild ones from sulfanilamide, rarely requiring more than a reduction in the dosage.

Sulfathiazole, like sulfapyridine, has a tendency to precipitate in concentrated urine when large doses are administered. As already stated, no stone formations in the kidney or bladder have been observed by us. We have, however, taken care to reduce the dosage or increase the fluid intake when the urine became hazy with precipitated sulfathiazole.

Peripheral neuritis, which sometimes arises from sulfanilyl-sulfanilamide, sulfanilyl-dimethyl sulfanilamide and sulfamethylthiazole was not noted in any of the patients treated with sulfathiazole.

The curative effects of sulfapyridine are generally conceded to be better than sulfanilamide in gonorrheal infections. The chief disadvantage of sulfapyridine is its disturbing effect upon the stomach.

Our impression of sulfathiazole is that it is as effective as sulfapyridine in the treatment of gonorrhea and far less disturbing to the patient.

Regardless of the mildness of the toxic reactions of sulfathiazole, it should be remembered that careful supervision is just as necessary during its administration as it is with other sulfonamide preparations.

SUMMARY

(1) Sulfathiazole was used in the treatment of 45 patients with gonorrhea.

(2) It was observed to have fewer and less severe toxic reactions than sulfanilamide or sulfapyridine. No serious by-effect has so far been noted.

(3) It was more effective than sulfanilamide in the treatment of gonorrhea.

(4) The doses used were about the same as those of sulfanilamide.

STUDIES ON THE EPIDEMIOLOGY OF OXYURIASIS*

By WILLI SAWITZ, M.D.
JOSEPH S. D'ANTONI, M.D.
KENNETH RHUDE, B.A.
and
SYDNEY LOB, B.S.
New Orleans, Louisiana

INTRODUCTION

Alexander of Tralles,[1] in the Sixth Century, ascribed to pinworms "the privilege over other helminths of being tormentors of any people of any age," and Leuckart,[2] some seventy years ago, believed that "there may be only a few who do not harbor them at one time or another." These statements are still true today. Oxyuriasis is the commonest of all helminthic infections in man, because *Enterobius* eggs are deposited on the perianal and perineal skin of the host in large numbers, soon become infective and may contaminate any object in the environment. Although eggs have been demonstrated scattered throughout a home, the epidemiologic factors involved in the spread of oxyuriasis are not fully understood.

The NIH (Nat. Inst. Health) swab[3] has provided a more reliable diagnostic technic for oxyuriasis and thus, a more accurate method for the study of its epidemiology than has heretofore been possible. In order to study the influence various factors might have upon the prevalence and spread of the infection, the incidence of *Enterobius vermicularis* infections has been determined in various population groups in children's institutions.

DESCRIPTION OF INSTITUTIONS SURVEYED

Six children's Homes in New Orleans, Louisiana, with a total population of 491 children, have been surveyed. Almost all the children

---

*Read in Section on Public Health, Southern Medical Association, Thirty-Third Annual Meeting, Memphis, Tennessee, November 21-24, 1939.

*From the Tulane Amebiasis Unit, National Institute of Health, in collaboration with the Parasitology Laboratory, Department of Tropical Medicine, Tulane University School of Medicine, New Orleans, under the direction of Ernest Carroll Faust.

*This study was made possible through the kind permission of Drs. Maud Loeber, Herbert Weinberger, Isidore Cohn, Julian Graubarth and Ernest Cherrie, physicians in charge of the medical care of the children examined. We wish to express our indebtedness to them as well as to the Mothers Superior, Sisters, Fathers, superintendents and nurses in the institutions surveyed, for their sincere and helpful cooperation during this study.

examined had lived in institutions since birth, although some had changed from one institution to another. Relevant information concerning these homes is presented below.

M. M. is a relatively new suburban building with spacious lawns and a swimming pool. The home had a very clean appearance, although numerous flies were found. Twenty-seven white girls and one hundred nine white boys, aged 5 to 14 years, were under the supervision of an order of Sisters. The sleeping accommodations were in three large dormitories with single beds. The *Enterobius* findings in this home have been previously reported.[4]

H. H. is a spacious suburban building, with large lawns and a swimming pool. The home had a satisfactorily clean appearance; flies were especially noticeable in the kitchen and dining rooms. One hundred twenty-eight white boys, aged 11 to 18 years, were under the supervision of 15 Catholic Fathers. They had individual beds in three large dormitories.

P. E. is an old urban building with a play lawn. The general appearance was not hygienically satisfactory, although flies were not noticed in large numbers. Thirty-two white girls, aged 5 to 21 years, were under the supervision of a superintendent and a trained nurse and there were six white and five colored adult helpers. Some of the girls had individual rooms while others shared them with a roommate. Most of these rooms were separated from larger rooms by curtains, which were so hung as to leave an open space between the top of the curtain and the ceiling. The smaller children slept in dormitories.

J. C. is a large urban building with a large patio. The home was kept scrupulously clean; flies were not noticed. The 28 white girls, aged 3 to 18 years, and 41 white boys, aged 6 to 18 years, were under the supervision of a superintendent and a trained nurse; the total personnel consisted of 26 white and 7 colored helpers. Most of the children had individual rooms.

J. B. is an old building with a large play lawn. The home was kept very clean; only a few flies were noticed. Sixty-three colored girls, aged 3 months to 31 years, were under the supervision of 12 colored Sisters. The children slept in separate beds in four large dormitories.

L. H. is a modern suburban building with a very efficient and airy arrangement of the rooms. There were two large dormitories equipped with air-cooling attic ventilation and a nursery. The 63 colored boys, aged 3 months to 14 years, had their own beds and were supervised by 10 colored Sisters.

TECHNIC OF EXAMINATION

The NIH swab technic, as described by Hall[3] (1937), was used for diagnosis. The swabs were obtained early in the morning; at M. M., H. H., J. B., and L. H. at 9 A. M., and at P. E. and J. C. immediately after the children got up and before they washed and dressed. All swabs were obtained by one of our group except at J. B., where a Sister took them from the girls over 13 years of age.

Since it had previously been shown[4] that at least 7 swabs are necessary to be certain of freedom from *Enterobius* infection, this number was obtained from each child, unless found positive earlier. The time between consecutive swabs was usually 2 or 3 days, except at L. H. where they were obtained daily. The swab preparations were examined under the low power of the microscope. The individual parts of the swabs were cleaned as described by Folan.[5]

RESULTS

A total of 491 individuals was examined, of which 365, or 74.3 per cent, were positive for *Enterobius* infection. The incidence by homes was as follows: M. M., 96.3 per cent, as previously reported;[4] H. H., 96.9 per cent; P. E., 65.6 per cent; J. C., 37.7 per cent; J. B., 15.9 per cent; and L. H., 84.1 per cent.

Enterobius Incidence by Age, Sex and Race.—By comparing the incidence figures in the six institutions with the differences in the population groups and their general environments, it appeared possible that some factors involved in the epidemiology of oxyuriasis might be brought out. The detailed findings by age, sex and race for each of the six homes are presented in *Table 1.* The numerators indicate the number found positive, the denominators the number of individuals examined in each group. The one year of age column includes all children from birth to one and a half years; in all other groups the designated year is the median.

Incidence by Age.—The incidence by age is shown in *Fig. 1.* The curve is based on the totals for a two-year period rather than for one year, in order to have more adequate figures for statistical evaluation. The fractions at the bottom of the figure indicate the number found

positive (numerator) compared with the number examined in the respective period of age (denominator).

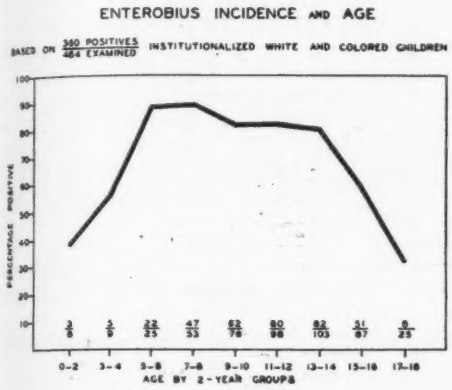

ENTEROBIUS INCIDENCE AND AGE
BASED ON 360 POSITIVES / 484 EXAMINED INSTITUTIONALIZED WHITE AND COLORED CHILDREN
PERCENTAGE POSITIVE
3/8 2/9 22/25 47/53 62/78 80/98 82/103 31/87 0/25
0-2 3-4 5-6 7-8 9-10 11-12 13-14 15-16 17-18
AGE BY 2-YEAR GROUPS

Fig. 1

Incidence by Sex.—The incidence among boys was 302/441, or 88.6 per cent. The incidence among girls was 63/150, or 42.0 per cent. The incidence curve by sex and age is presented in *Fig. 2*. The incidence percentages are calculated from *Table 1* by 3-year age groups.

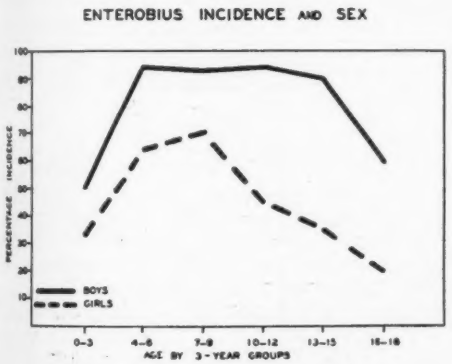


Fig. 2

Incidence by Race.—The incidence among the white children was 302/365, or 82.7 per cent. The incidence among the colored children was 63/126, or 50.0 per cent. The incidence figures by 3-year age groups and by race are graphically demonstrated in *Fig. 3*.

In an attempt to eliminate factors other than race which might have influenced the two curves by race, *Fig. 4* has been compiled to show the

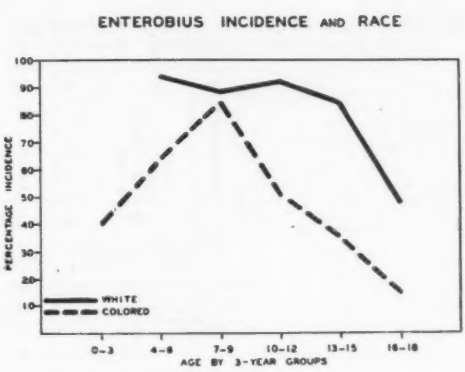


Fig. 3

incidence for boys of the two races living in institutions having comparable environments. No comparable groups of white and colored girls were available in the six homes.

Enterobius Incidence and Institutional Environment.—All of the 491 children examined were completely institutionalized, but the homes differed considerably as regards the size of the dormitories. In some, the children occupied single or double rooms, while in others they slept in large dormitories. The largest dormitory accommodated 51 children. Owing to the peculiar factors governing the transmission of oxyuriasis, a difference in incidence was anticipated among children in small and large dormitories.

Thirty-nine children, of whom 11 (28 per cent) were found positive, slept in single rooms. Twenty-eight children, of whom 10 (36 per

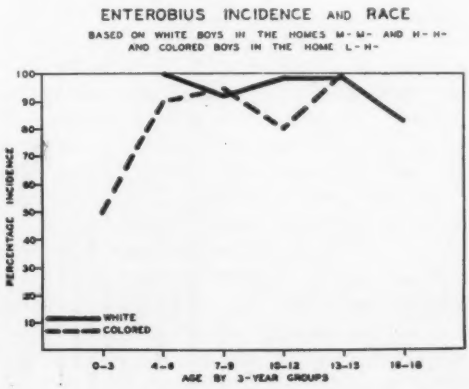

ENTEROBIUS INCIDENCE AND RACE
BASED ON WHITE BOYS IN THE HOMES M-M- AND H-H-
AND COLORED BOYS IN THE HOME L-H-
PERCENTAGE INCIDENCE
WHITE
COLORED
0-3 4-6 7-9 10-12 13-15 16-18
AGE BY 3-YEAR GROUPS

Fig. 4

DISTRIBUTION OF ENTEROBIUS INFECTION

BY INSTITUTION, SEX, RACE AND AGE

HOME		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		21		31		UNKNOWN		TOTAL		PERCENTAGE		TOTAL	PER CENT
		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
M- M- WHITE	BOYS	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4/4	—	13/15	—	8/8	—	15/16	—	17/18	—	29/29	—	4/6	—	12/12	—	2/2	—	—	—	—	—	—	—	—	—	5/5	—	193/198	—	98.3	—	131/136	96.3
	GIRLS	—	—	—	—	—	—	—	—	4/4	—	8/8	—	4/4	—	2/2	—	2/2	—	2/2	—	4/6	—	—	—	—	—	1/1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	28/27	—	98.3		
H- H- WHITE	BOYS	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	19/19	—	28/26	—	33/34	—	30/30	—	10/13	—	4/4	—	—	—	—	—	—	—	—	—	124/126	—	98.9	—	124/126	98.9
P- E- WHITE	GIRLS	—	—	—	—	—	—	—	—	2/2	—	1/2	—	2/2	—	1/2	—	1/2	—	1/2	—	—	—	2/3	—	2/2	—	5/5	—	4/5	—	2/3	—	1/3	—	—	—	0/1	—	—	—	—	—	21/32	—	65.6	—	21/32	65.6
J- C- WHITE	BOYS	—	—	—	—	—	—	—	—	2/2	—	1/1	—	1/1	—	1/1	—	—	—	1/1	—	1/1	—	2/2	—	3/6	—	2/4	—	1/5	—	1/7	—	1/2	—	0/2	—	—	—	—	—	—	—	20/47	—	48.8	—	48/69	37.7
	GIRLS	—	—	—	—	—	—	0/1	—	—	—	—	—	—	—	—	—	0/1	—	—	—	1/3	—	0/1	—	1/1	—	1/3	—	1/6	—	1/5	—	0/4	—	0/1	—	—	—	—	—	—	—	6/28	—	21.4		
J- B- COL.	GIRLS	0/1	—	0/1	—	—	—	0/2	—	0/1	—	2/3	—	—	—	1/2	—	1/2	—	2/4	—	0/2	—	0/2	—	—	—	1/2	—	0/2	—	1/4	—	0/2	—	1/3	—	—	—	—	—	—	—	10/65	—	15.9	—	10/65	15.9
L- H- COL.	BOYS	1/1	—	2/2	—	1/2	—	3/3	—	1/2	—	—	—	4/6	—	3/6	—	2/2	—	—	—	1/2	—	2/2	—	1/1	—	2/2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	53/83	—	64.1	—	53/83	64.1
WHITE	BOYS	—	—	—	—	—	—	—	—	—	—	—	—	9/9	—	14/16	—	19/19	—	19/19	—	33/33	—	—	—	31/36	—	33/36	—	31/35	—	11/20	—	5/6	—	—	—	—	—	—	—	2/2	—	244+3/273+5	—	89.6	—	102/305	82.7
	GIRLS	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7/7	—	6/6	—	3/3	—	2/2	—	3/3	—	3/3	—	4/7	—	3/11	—	3/6	—	1/7	—	0/1	—	—	—	—	—	—	—	53+0/86+1	—	60.9		
COLORED	BOYS	1/1	—	2/2	—	1/2	—	3/3	—	1/2	—	—	—	5/6	—	5/6	—	2/12	—	2/4	—	3/3	—	2/2	—	2/3	—	2/2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	53/83	—	64.1	—	53/83	64.1
	GIRLS	0/1	—	0/1	—	—	—	0/2	—	0/1	—	2/3	—	1/2	—	0/1	—	1/2	—	1/2	—	0/5	—	0/7	—	1/6	—	1/6	—	0/7	—	1/6	—	0/5	—	1/3	—	0/1	—	—	—	—	—	10/62+0/1	—	15.9		
BOYS		1/1	—	2/2	—	1/2	—	3/3	—	1/2	—	1/2	—	5/6	—	11/11	—	20/22	—	15/15	—	21/23	—	8/11	—	28/31	—	24/40	—	33/35	—	11/20	—	5/6	—	1/3	—	—	—	—	—	2/2	—	297+5/336+5	—	88.6	—	302/341	88.6
GIRLS		0/1	—	0/1	—	1/1	—	0/3	—	2/3	—	1/2	—	3/6	—	7/8	—	8/10	—	3/6	—	4/7	—	10/15	—	4/11	—	5/12	—	2/11	—	3/16	—	1/12	—	1/4	—	0/1	—	0/1	—	—	—	63+0/148+2	—	42.0	—	63/150	42.0
TOTAL		1/1	2/2	2/3		3/3		3/6		3/5		3/6		8/12		18/19	28/32	28/32		23/27		25/30		27/36		43/52		27/48		49/56		16/21		6/8		1/4		0/1		0/1		3/5		360+8/424+5		88.6		365/491	74.3

Table 1

cent) were found positive, slept in double rooms. Thirty-four children, of whom 27 (79 per cent) were found positive, slept in dormitories of 3 to 8 beds. Three hundred ninety children slept in larger dormitories and of these 317 (81 per cent) were found positive.

In general, individual rooms were more likely to be occupied by older children, whereas most of the younger children slept in dormitories. The lower incidence in children in individual rooms might thus be an indirect result of age and this is implied in *Fig. 1*, which shows a decline of incidence after 14 years of age. However, the incidence by size of accommodations and 2-year age groups, as presented in *Fig. 5* does not support this view.

ENTEROBIUS INCIDENCE AND SIZE OF ACCOMMODATIONS

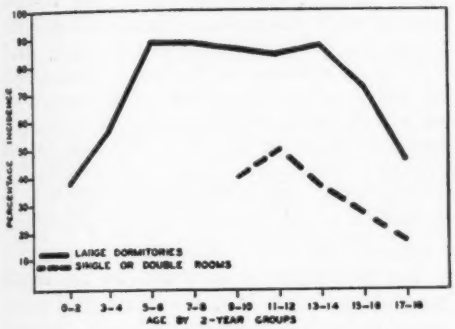


Fig. 5

Incidence and Economic Factors.—A striking observation in the various homes was the difference in the number of adults who took care of the children and the amount of money spent for maintenance, both as to the total expenditure and amount spent only on food. This is shown in *Table 2*. The data for the home M. M. were not available.

Enterobius Incidence and Cleanliness.—The spread of *Enterobius* infection from one individual to another requires that the eggs be swallowed, after they have been brought to the mouth by air, food or fingers. The presence of viable eggs in several locations was demonstrated in H. H. Viability was determined by hatching the eggs in artificial gastric juice.

In addition to eggs found in the perianal region of the children, some were recovered in two instances from their pajama pants. Scrapings from the inside of the pants were examined

ENTEROBIUS INCIDENCE IN COMPARISON WITH THE NUMBER OF ADULTS AND AMOUNT OF MONEY SPENT IN TOTO AND FOR FOOD ONLY.

Home	*Enterobius* Incidence Per Cent	Ratio of Adults to Children	Daily Expenditures per Child in Dollars	
			Total	For Food
H.H.	96.9	1 : 9	0.44	0.22
L.H.	84.1	1 : 6	0.30	0.16
P.E.	65.6	1 : 2.5	1.12	0.32
J.C.	37.7	1 : 2	1.88	0.41
J.B.	15.9	1 : 5	.34	0.16

Table 2

in a drop of saline on a slide. Eggs were also demonstrated in material scraped from bed sheets. Dust was collected in the dormitories from ledges of pillars, doors and windows, floor cracks, lamps and open pipes beneath the ceiling, while in the toilet rooms it was taken from sills of toilet doors and the top sills of toilet partitions. The dust samples were examined in saline, either in Petri dishes or on slides. Eggs were recovered from all samples except those obtained at heights greater than eight feet from the floor, that is, the ceiling lamps, pipes and the high ledges of windows. Although no quantitative egg study was made, it was noticed that the samples from the toilet rooms contained more eggs than those from the dormitories.

Material from under the fingernails was examined from 40 children whose *Enterobius* infection had been determined by means of the NIH swab technic. Only one viable egg was recovered in one instance.

Nasal swabs were examined from 36 positive children, but no eggs were found.

In the homes J. C., J. B. and L. H. attention was paid to the number of children who were in the habit of biting their fingernails. The appearance of the fingernails and admission of the habit by the children was used as evidence. Of 60 children with the habit of nail biting 30, or 50 per cent, and of 120 non-biters 65, or 54 per cent, were positive for *Enterobius*.

The relationship between general hygienic practices in the homes and *Enterobius* incidence is presented in *Table 3*. The data for the home M. M. were not available. The following indexes of hygienic practice were used: frequency of thorough house cleaning; frequency of change

of bed linen, night clothes and underwear; number of showers; use of nail brushes.

After the *Enterobius* incidence in J. C. had been determined, hygienic measures were introduced in this institution to an extent usually not feasible for institutionalized children. Each room in the house was thoroughly cleaned daily with hot water and soap, bed sheets were changed every day and were sterilized before being used again, cotton shorts were worn by all children during the night with or without other night clothes and these shorts were changed every day and sterilized before being used again. The children took a shower twice a day. Nail brushes were provided and their use enforced. Nail brushes were previously not available to the children, either in this home or in any of the other homes. These measures were carried out over a period of six weeks, at a cost of more than $700.

While the first survey in this home revealed 6 out of 28 girls to be infected and 20 out of 41 boys, an examination after the six-week cleanliness experiment showed that 3 of the 6 previously positive girls were still infected, 2 were negative and one had left the home for vacation. Four of the 22 girls previously negative were now found infected, 14 were negative, and 4 had left on vacation. Fourteen of the 20 boys previously positive were still infected, 3 were negative, and 3 had left for vacation. Nine of the 21 boys previously negative were now found infected, 9 were still negative, and 3 had left for vacation. Thus, while the first survey revealed 26 positive out of 69 children the survey after the experiment revealed 30 positive out of 58 children, or a percentage positive increase of 13.

DISCUSSION

The incidence of 74.3 per cent *Enterobius vermicularis* infection in 491 institutionalized children in New Orleans (including 136 previously published[4]) is the highest yet reported in the United States. Most previous reports, however, have been based on stool examination alone and these cannot be used for comparison, because efficient stool examination technics discover not more than one-fourth of the cases found positive by the NIH swab technic. Even the results based on the swab technic do not necessarily represent the actual incidence unless the negative reports are based at least on 7 negative swab examinations.[4]

Headlee,[6] in 1935, used a single examination by means of an anal scraper and found 22 per cent of 282 individuals from 15 to 60 years of age at the Kankakee (Illinois) State Hospital infected with *Enterobius*. Smith, Gill and McAlpine,[7] in 1937, used several NIH swab examinations in addition to the salt floatation technic and found 65.15 per cent infected among 637 white individuals of various ages up to 70 years, institutionalized in the Bryce Hospital at Tuscaloosa (Alabama). Cram and Reardon,[8] in 1939, summarizing finding in Washington, D. C., reported a 41 per cent incidence in 2,097 persons, based on NIH swab examinations.

The difference in incidence in the institutionalized children in the area reported in this paper and in the incidence found by the workers cited is believed to be due to a difference in responsible factors in the areas as well as to more thorough diagnosis rather than the assumption of a high endemic focus in the New Orleans area. The factors studied in this report

ENTEROBIUS INCIDENCE AND HYGIENIC PRACTICES

Home	House Cleaning	Bed Sheets	Change of Night Clothes	Change of Underwear	Showers	Nail Brushes	*Enterobius* Incidence
H. H.	Once a year	Once a week	Twice a week	Twice a week	Once a day	——	96.9
J.C. Before	Twice a year	Twice a week	Twice a week	Every other day	Once a day	——	37.7
J.C. After 6 weeks of cleanl. experim.	Daily	Daily	Daily	Daily	Twice a day	Daily	50.9
P.E.	Once a year	Once a week	Twice a week	Every other day	Once a day	——	65.6
J.B.	Once a week	Twice a month	Once a week	Every other day	Every other day	——	15.9
L.H.	Once a week	Once a week	Once a week	Every other day	Once a day	——	84.1

Table 3

have been divided into physiologic, including age, sex and race; environmental, such as the institutional set-up; and hygienic, institutional and personal.

Enterobius Incidence and Age.—The curve in *Fig. 1* shows a rising incidence up to 6 years of age, a high plateau from 6 to 14 years, and a rapid decrease after 14 years. This conforms to general clinical experience and to reports in the literature.[7 8 9 10 11 12 13]

No infection was found in the present study in children under 1 year of age (2 colored boys and 1 colored girl). According to Heller and Gribbohm, as compiled by Goebel,[14] the earliest incidence was in nurslings of 5 weeks. Goebel explained the infrequency of infection in the first year of age on the grounds that infants are seldom exposed to the infection, and to the effect that milk feeding may possibly have on the developing larvae.

Obviously the age incidence curve in *Fig. 1* represents the effects of a complexity of factors. In addition to age these factors probably include, among others, sex, race, environment and personal habits.

Enterobius Incidence and Sex.—The difference in the incidence of 88.6 per cent in boys and 42.0 per cent in girls might appear to be significant. Stiles and Garrison,[15] in 1906, reported a 1.43 per cent incidence in 2,311 males and a 0.26 per cent incidence in 1,146 females, based on 10 or more direct fecal examinations of each individual. They warned, however, that

"too much importance must not be attached to the excessive male infection with pinworms * * * the simple life cycle of the worm and its direct transmissibility from person to person would indicate that it would spread in any part of an institution in which it happened to be introduced."

Wilhelmi and Quast,[13] in 1925, found a 60.8 per cent incidence in 637 boys and a 59.9 per cent incidence in 212 girls, from comparable environments and of comparable age groups (7 to 14 years). Smith, Gill and McAlpine,[7] in 1937, found an 82.55 per cent incidence in 384 males and a 38.74 per cent incidence in 253 females. Cram and Reardon,[8] in 1939, found a 44.4 per cent incidence in 1,234 males and 35.6 per cent in 566 females.

Since the incidence curve shows differences in the different age groups, conclusions from incidence figures by sex cannot be drawn unless the groups compared correspond in age. *Fig. 2*, which presents the incidence in this series by sex and age, shows similar curves for both sexes up to 9 years of age, although the incidence in males remains relatively constant up to 15 years, while that in females drops after the ninth year. However, both curves include the findings in white and colored children.

Enterobius Incidence and Race.—The incidence in white children was 82.7 per cent, in colored children 50 per cent. Stiles and Garrison[15] noted a difference in incidence of 0.54 per cent in 746 white patients as compared to 0.26 per cent in 378 negro patients. Cram and Reardon[8] found 44.8 per cent positive in 1,611 white and 14.8 per cent in 189 colored persons. Keller, Leathers and Knox[16] reported an incidence of 0.7 per cent in 37,346 white persons and 0.03 per cent in 6,301 negroes. Stool examinations were used.

Again, conclusions cannot be drawn from total incidence figures by race unless the groups compared correspond in age. *Fig. 3*, in which the incidence is presented by race and age, still shows a difference in incidence in the two races.

Enterobius Incidence and Environment.—The incidence curves by race as well as those by sex are based on findings summarized from results obtained in groups of individuals living under quite different environmental conditions. In order to evaluate the significance of any special biologic susceptibility due to age, sex or race, the influence of the environmental conditions has to be considered. That environmental conditions influence the incidence of any infection is well known and has resulted in measures to control conditions favorable to dissemination. For *Enterobius* infection these conditions are not yet understood. The six institutions with their different environmental conditions present an opportunity for studying the possible effects of environment upon *Enterobius* incidence.

Fig. 5 shows the relationship between the size of living accommodations and incidence of oxyuriasis. While 31 per cent of the children in single and double rooms were found infected, 81 per cent of those in dormitories (3 to 51 in a room) were infected. Since it was more likely that older children would occupy the small rooms and thus permit the age factor to supervene, the incidence curve was plotted by size of dormitory accommodations and by age. The findings indicate that the incidence is definitely lower in the small room group. This result supports the general view that oxyuriasis is associated with congested living conditions.

Enterobius Incidence and Cleanliness.—Eggs of *Enterobius* were recovered in the home H. H. from pajama pants, bed sheets, ledges of pillars, doors and windows and from floor cracks.

Enterobius eggs have previously been demonstrated by Oleinikov[17] from the floors, benches and window sills of a school room and by Nolan and Reardon[18] in homes from floors, baseboards, table legs and tops, chairs, davenports, standing lamps, dresser and cabinet tops, shelves, picture frames, window sills and frames, top moldings of doorways and windows, ceiling lights, chandeliers, bed sheets, mattress and framework of beds, bath tubs, wash basins, toilet seats, and from children's toys and outer play garments.

Nolan and Reardon (1. c.) suggested that infection by inhalation should be considered in the prophylaxis and therapy of oxyuriasis. In order to test this suggestion, a 6-week cleanliness program was inaugurated in the home J. C. under conditions where it was likely that the advice of thorough daily house cleaning, daily change of shorts, bed sheets and underwear and the use of nail brushes would be carried out. The home was already clean before the experiment was undertaken. The period of 6 weeks was chosen because, according to Hall and Cram,[19] the life span of pinworms appears to be from 15 to about 28 days, and because Lentze[20] demonstrated that *Enterobius* eggs retain their infectivity for about 9 days. The surprising result of an actual increase in incidence from 38 to 51 per cent shows that the measures taken did not reduce the opportunities of infection. Inhalation probably does not play an important part in this infection. The eggs scattered in the rooms probably lose their infectivity earlier than has been supposed. In our own experiments they retained their viability for 19 days when kept at room temperature and exposed to air. In Lentze's experiments[20] eggs lost their infectivity after 2 or 3 days at 19 to 20° C. and 30 to 40 per cent humidity, and after 7 to 9 days at summer temperature and high humidity, even though the larvae hatched. The infectivity was tested by feeding the eggs to mice and later examination of the mice's intestines.

Moreover, the negative result of this cleanliness experiment in the home J. C. is in harmony with the failure to correlate the *Enterobius* incidence in the homes surveyed with the number and frequency of house cleaning and bathing or the changes of underwear and bed sheets (*Table 3*). These hygienic measures did not interrupt the important transmission route or routes of *Enterobius*.

Lentze[20] discussed the possibility that a preponderant carbohydrate diet produces conditions in the bowel favorable for the development of *Enterobius*. In this way he explained the increase in incidence of pinworms in Germany during the World War, when fat and protein were very scarce. No exact information on the ratio of carbohydrates, fat and protein in the food in the six surveyed institutions could be obtained, although it is reasonable to assume that the lower the food expenditure, the more the food would consist of carbohydrates. No correlation, however, could be demonstrated (*Table 2*) between incidence and food expenditure.

The habit of biting fingernails was thought to further oxyuriasis, but no correlation could be found between *Enterobius* incidence and this habit. It seems that those with bitten, short fingernails cannot pick up and retain the eggs as easily as those with longer nails. The increased chance of infection as a result of putting the fingers in the mouth seems to be balanced by the lesser chance of picking up the eggs with short fingernails. This view may be supported by the results of Wilhelmi and Quast[13] in their study of 1,024 children. These authors found *Enterobius* eggs in the fingernail scrapings from 69 per cent of those with long nails and in 57 per cent of those with short and bitten nails.

SUMMARY AND CONCLUSIONS

Six children's homes in New Orleans, Louisiana, with 278 white boys, 87 white girls, 63 colored boys and 63 colored girls, have been examined for *Enterobius vermicularis* infection by means of the NIH swab. The total incidence found was 74.3 per cent; the highest in one home being 96.9 per cent, the lowest 15.9 per cent. The incidence in all white boys was 89.6 per cent, in white girls 60.9 per cent, in colored boys 84.1 per cent, and in colored girls 15.9 per cent.

The incidence by age showed an increase during the first 6 years of life. It remained high until 14 years and decreased thereafter.

The incidence by age and sex showed a slightly lower incidence in girls than in boys under comparable environmental conditions in the first 6 years of age, an equally high incidence up to 9 years of age, after which the inci-

dence fell in girls, while it remained high for boys.

The incidence by age and race showed no difference in incidence if groups of the same age and sex and under the same environmental conditions were compared.

The incidence in children of comparable age was more than twice as high among those in large dormitories as among those in single or double rooms.

Enterobius eggs were recovered from pajama pants, bed sheets and ledges of pillars, windows and doors of dormitories and toilet rooms.

The usual hygienic measures such as frequent house cleaning, change of underwear and bed sheets and frequent bathing did not interrupt the important transmission routes of *Enterobius*. A cleanliness period of six weeks in one home did not result in any decrease in incidence of the infection.

The *Enterobius* incidence among children biting their fingernails was not greater than among those who did not.

No correlation was found between *Enterobius* incidence and the amount of money spent for the maintenance of the institution or for the food of the children.

The important transmission route of *Enterobius vermicularis* appears to be by direct contact with infected individuals or contaminated objects. The curve by age with its increasing incidence up to 6 years, its plateau up to 14 years and its decrease thereafter, may tentatively be explained as follows: *Enterobius* infections in the first year of age are exceptional because babies usually remain in their separate beds and do not often come in prolonged contact with other children. From 1 through 5 years of age, the incidence increases with age, with no great difference between boys and girls. Both come more and more in direct personal contact with other children, but they are washed and taken care of in their homes by their mothers and in institutions by Sisters or nurses. From 6 years on, the incidence runs highest; the children come in close contact with each other during school or play and although they wash themselves they do not do so effectively. The curve continues high, unless environmental conditions such as separate bedrooms or rigid personal cleanliness control the infection. These factors become operative in the lives of girls earlier than of boys and may thus account for the decrease of incidence in girls after 9 years and in boys after 15 years or later.

REFERENCES

1. Alexander, Trallianus, from Puschmann: Alexander von Tralles, ein Beitrag zur Geschichte der Medizin. Vienna, 1878, Braumuller's Verlag. Quoted from Kuchenmeister, F., and Zurn, F. A. Die Parasiten des Menschen, 2nd Edition. Leipzig, 1881, Verlag von Ambrosius Abel.
2. Leuckart, R.: Die menschlichen Parasiten und die von ihnen hervorgerufenen Krankheiten, **2**:343. Leipzig and Heidelberg, 1876.
3. Hall, M. C.: Studies on Oxyuriasis. I. Types of Anal Swabs and Scrapers, with a Description of an Improved Type of Swab. Amer. Jour. Trop. Med., **17**:445-453 (May) 1937.
4. Sawitz, W.; Odom, V. L.; and Lincicome, D. R.: The Diagnosis of Oxyuriasis: Comparative Efficiency of the NIH Swab Examination and Stool Examination by Brine and Zinc Sulphate Floatation for *Enterobius vermicularis* Infection. Public Health Reports, **54**:1148-1158 (June) 1939.
5. Folan, J. P.: The Preparation and Cleaning of the NIH Anal Swab Used in the Diagnosis of Oxyuriasis. Public Health Reports, **54**:1392-1395 (July) 1939.
6. Headlee, W. H.: Studies on Infections of Human Parasitic Worms Under Institutional Conditions. Jour. Lab. & Clin. Med., **20**:1069-1077 (July) 1935.
7. Smith, W. H. Y.; Gill, D. G.; and McAlpine, J. G.: Intestinal Parasite Survey in Alabama. Sou. Med. Jour., **32**:1094-1103 (Nov.) 1939.
8. Cram, E. B.; and Reardon, L.: Studies on Oxyuriasis. XII. Epidemiological Findings in Washington, D. C. Amer. Jour. Hygiene, **29**:17-24, Section D (Jan.) 1939.
9. Banik, F.: Ueber die Haufigkeit der tierischen Darmparasiten bei Kindern in Munchen. Inaugural Dissertation, Munchen, 1886, quoted from ref. 20.
10. Ruotsalainen, A.: Studien uber die Haufigkeit der Darmparasiten, namentlich des Oxyuris vermicularis, bei Kindern. Monatsschrift fur Kinderheilkunde, **10**:325, 1911, quoted from ref. 14.
11. Berndt: Vergleichende Stuhluntersuchungen auf Helmintheneier in Thuringen. Zentralblatt fur Bakteriologie, Abt. I, Originale, **83**:550, 1919, quoted from ref. 20.
12. Japha, A.: Die Verbreitung von Oxyuris vermicularis bei Schulkindern. Munchener Medizinische Wochenschrift, **72**: 473-474 (March) 1925.
13. Wilhelmi, J.; and Quast, M.: Ueber die Verbreitung and den Nachweis der Oxyuriasis. Klinische Wochenschrift, **4**:964-967 (May) 1925.
14. Goebel, F.: Die Oxyuriasis. Ergebnisse der innern Medizin und Kinderheilkunde, **22**:106-138, 1922.
15. Stiles, Ch. W.; and Garrison, Ph. E.: A Statistical Study of the Prevalence of Intestinal Worms in Man. Treasury Department, Public Health and Marine-Hospital Service of the United States. Hygienic Laboratory Bulletin No. 28 (Aug.) 1906.
16. Keller, A. E.; Leathers, W. S.; and Knox, J. C.: The Incidence and Distribution of *Ascaris lumbricoides, Trichocephalus trichiura, Hymenolepis nana, Enterobius vermicularis* and *Hymenolepis diminuta* in Seventy Counties in North Carolina. Amer. Jour. Hygiene. **27**:258-274, 1938.
17. Oleinikov, S. V.: (Diagnosis and Epidemiology of *Enterobius*.) In Russian. Russ. Jour. Trop. Med. & Vet. Parasitol., **7**: 393-402, 1929, quoted from ref. 18.
18. Nolan, M. O.; and Reardon, L.: Studies on Oxyuriasis. XX. The Distribution of the Ova of *Enterobius vermicularis* in Household Dust. Jour. Parasitol., **25**:173-177 (April) 1939.
19. Hall, M. C.; and Cram, E. B.: Studies on Oxyuriasis. XVII. The Special and Peculiar Nature of Oxyuriasis. Volumen Jubilare pro Prof. Sadao Yoshida, Osaka, Japan, **2**:249-267 (March) 1939.
20. Lentze, F. A.: Ueber die Verbreitung von Spul- und Madenwurmern und uber die Massnahmen zu ihrer Bekampfung vom Standpunkte der offentlichen Gesundheitspflege. Veroffentlichungen aus dem Gebiete der Medizinalverwaltung, **37**:52-129, 1932.

DISCUSSION (*Abstract*)

Dr. W. H. Wright, Washington, D. C.—Dr. Sawitz' data indicate very strikingly the ease with which the parasite is disseminated by reason of its peculiar biological adaptation which enables it to by-pass nearly all the barriers of modern sanitation. The correlation between a high incidence and crowded living conditions

in the dormitories of institutionalized individuals demonstrates the importance of close environmental contact in the spread of infection.

In our Washington studies, Dr. Eloise B. Cram and her associates have found an incidence of pinworms of approximately 30 per cent in several thousand individuals examined. These persons represent various population groups, including some institutionalized individuals, children in nursery schools and children attending summer camps. Over 600 individuals were from the general population and in these individuals the pinworm incidence was 35 per cent. While these cases did not represent a random sampling of the population and the incidence figure in this group is probably higher than is the general incidence figure, yet the latter figure is an impressive one.

The abundant opportunities for acquiring oxyuriasis in infected households and institutions are emphasized by the results of Reardon of egg counts in 20 gravid female pinworms in which the mean of the counts was 11,105 and by the findings of Nolan and Reardon, who were able to recover pinworm ova from objects at all levels in all rooms in infected households. These data point to the wide distribution of ova in the environment of infected individuals.

In one particular, the studies of Cram and her associates do not coincide with results obtained by Dr. Sawitz. In the Washington studies, a lower incidence has been consistently obtained in negroes. Although few of the negroes were institutionalized, the findings may point to an exception in the thesis that oxyuriasis is definitely correlated with crowded living conditions.

To my mind, one of the highlights of the present paper concerns the absolute failure to control pinworm infection by the rigid application of the extraordinary hygienic measures employed in the one institution. This is entirely in keeping with the observations in our Washington studies. Such a result indicates the need for the revision of textbook recommendations which frequently stress this so-called method of control. The work of Dr. Sawitz has shown very definitely that the use of chemotherapeutic measures is necessary in any attempt to control pinworm infections.

Dr. E. J. Sunkes, Augusta, Ga.—May I ask Dr. Wright how long after the use of the NIH swab would it be possible to examine the swab and still find pinworm ova?

Dr. W. H. Wright, Washington, D. C.—In answer to Dr. Sunkes' question it might be well to offer an explanation as to the construction of the NIH anal swab. It is a glass rod approximately four inches long, on the end of which is attached by means of a rubber band a piece of cellophane 25 mm. square. The glass rod is fitted with a rubber cork which is inserted into a test tube, thus providing a housing for the swab.

After these swabs have been used on the suspected case of pinworm infection, they can be examined at almost any time. In fact, I think we have kept them for as long as two or three weeks before examination was made. The cellophane seems to be slightly adhesive and the pinworm eggs seem to be slightly adhesive; thus they stick very well to the cellophane and remain adhered for the most part until an opportunity is had to make the examination in the laboratory.

Dr. Sawitz (closing).—General hygienic practices are apparently ineffective in reducing oxyuriasis incidence. However, circumstantial evidence justifies us in considering as preventive measures rigid personal cleanliness and the treatment of all those infected in an institutional group.

I should like to emphasize the fact that the results obtained among these institutionalized children are applicable to the problem of oxyuriasis in large families. It seems that the incidence of oxyuriasis in large families increases with the size of the family in a home and that, when one member of a family is found infected, other members are probably also infected. Reinfection will occur unless all positive members of a household are cured.

THE INCIDENCE OF PINWORM (*ENTEROBIUS VERMICULARIS*) INFECTION IN NORTH CAROLINA*

By H. W. Brown, M.D.
A. J. Sheldon, Sc.D.
and
T. Thurston, B.S. in Med.
Chapel Hill, North Carolina

Improvements in the diagnostic technic for the detection of the pinworm (*Enterobius vermicularis*) in man have stimulated new studies on the epidemiology of this parasite. Recent reports indicate that it may be much more prevalent than has been suspected. Bozicevich and Brady (1938) reported a 57.3 per cent infection rate among 504 white boys 6-16 years of age of low economic status from Washington, D. C. From the same city, Cram, Jones, Reardon, and Nolan (1937) reported 35.4 per cent of 628 persons from the general population to harbor this parasite. They state that this group was mainly from the lower economic strata. Inasmuch as certain helminth infections are especially prevalent in southern United States, we were interested in ascertaining the pinworm infection rate in North Carolina.

The groups examined were as follows:

(1) One hundred and thirty-two white boys, aged 8-14 years, from the Charlotte Observer Fresh Air Camp at Charlotte, North Carolina.

(2) One hundred whites and negroes of all ages. These people were patients at the Duke University Hospital Outpatient Clinic, Durham, North Carolina. They were not seeking aid due to symptoms which were referable to pin-

*Received for publication January 15, 1940.

*From the Division of Public Health of the University of North Carolina.

worms. These persons were from both rural and urban situations. In general they represent the lower income class group.

(3) One hundred and eighteen male students from the University of North Carolina, in Chapel Hill. Their ages varied from 17-31 years, the average age of the group was 21 years. The majority of this group were North Carolinians.

All specimens were obtained by means of the National Institute of Health Swab (N.I.H.) as described by Hall (1937). This swab consists of a piece of cellophane approximately ¾ inch square folded over the end of a small glass rod and held there by a rubber band. The swab is manipulated in the external anal region, special attention being given to scraping the perianal folds. The swab is returned to the laboratory in a test tube. The cellophane tip is removed with forceps and placed in N/10 sodium hydroxide on a glass microscope slide and a cover slip placed over it. This type of examination is superior to the usual fecal examination due to the fact that pinworms usually do not deposit eggs while in man's intestine. The eggs are usually extruded when the gravid female finds herself in the perianal region.

RESULTS

Single swab examinations made on 131 white boys at the Charlotte Observer Fresh Air Camp revealed a pinworm infection rate of 32.8 per cent (*Table 1*). The boys ranged from 8-14 years of age. Considerable variation in infection rate was encountered; for example, 25 per cent of the 10-year-olds were found to be infected, while the 13-year-age group infection rate was 50 per cent. In the relatively small groups examined such variations might be expected on the basis of chance. It would be necessary to examine a larger series before one could make a definite statement regarding the correlation between age and infection rate. The figure of 32.8 per cent infection rate is strikingly similar to the infection rate of a group of boys examined by Bozicevich (1937). This worker found an infection rate of 31.3 per cent among 230 underprivileged boys 6-18 years of age from Washington, D. C.

A group of 100 persons from the Duke University Hospital Outpatient Department were examined for pinworms. These persons for the most part all live within fifty miles of Durham. Sixty-seven of this group were white and 33 were negro. Both children and adults were included in the group which was definitely of the lower income group (*Table 2*). A total of 7.4 per cent of the whites were found infected with pinworm. It will be noted from *Table 2*, however, that the white group, 0-19 years of age, showed an infection rate of 16.6 per cent, while only 2.3 per cent of the group 20 and older were infected.

Not a single pinworm infection was found among the 33 negroes examined. This finding is somewhat surprising inasmuch as 24 of this number were from the 0-19 year age group. From experience with whites, one would expect this age group to be commonly infected with pinworm. The absence of pinworm infections in the negro group is unexpected, especially when one considers the mode of transmission of this parasite and the insanitary habits of the

Table 1

RESULTS OF PINWORM EXAMINATION OF 131 BOYS OF CHARLOTTE, N. C., FRESH AIR CAMP, 1939

Years Age	Total Number	Number Negative	Number Positive	Per Ct. Positive
8	1	1	0	0
9	29	17	12	41.3
10	16	12	4	25.0
11	41	28	13	31.7
12	24	17	7	29.2
13	8	4	4	50.0
14	3	3	0	0
Total	122	82	40	32.8

Table 2

PINWORM (*ENTEROBIUS VERMICULARIS*) INFECTION AMONG DUKE UNIVERSITY HOSPITAL OUTPATIENTS

Age	White				Negro			
	Male		Female		Male		Female	
	No. Exam.	Pos.	No. Exam.	Pos.	No. Exam.	Pos.	No. Exam.	Pos.
0-9	12	1	4	2	13	0	5	0
10-19	6	0	2	1	2	0	4	0
20-29	5	0	9	0	0	0	2	0
30-39	2	0	9	1	1	0	2	0
40 plus	5	0	13	0	0	0	4	0
Total	30	1	37	4	16	0	17	0
Per cent infected		3.3		10.8		0		0

negro. Although our group of negroes is small, our evidence of the lower infection rate among them is corroborated by findings of Cram, Jones, Reardon and Nolan (1937), who reported the pinworm infection rate among white adults twice that of negroes.

The foregoing data indicate that pinworm is a common infection at least in whites in the lower economic strata. It does not seem reasonable, however, that these relatively high infection rates apply to the population in general. Sanitary practices, which to a large extent affect the incidence of this parasite, vary considerably with economic status and education. A total of 118 persons from the upper economic class were examined for pinworm. This group was comprised of 100 male University of North Carolina students from the General College. They varied in age from 17-31 years of age, with an average of 21 years. Eighteen medical students from the University were also examined. Their ages ranged from 21-26 years with an average of 23 years. Not a single pinworm infection was found in either of these groups, although special care was taken in their examination.

DISCUSSION

Our finding of 32.8 per cent of the white boys from Charlotte, North Carolina, and 7.4 per cent of white persons in the Outpatient Department of Duke University Hospital at Durham, North Carolina, infected with pinworm indicates that this parasite is one of the most prevalent of the helminths. Our data confirm the results of Cram, Jones, Reardon and Nolan (1937), who reported similar and even higher infection rates in their Washington, D. C., studies. A partial explanation of the higher infection rate reported by the Washington workers is that they frequently made several swab preparations from an individual. They have shown that a single anal swab detects only a portion of the pinworm infections and that four swab examinations made at various intervals may increase the number of positives by as much as 100 per cent. It is quite likely, therefore, that the actual infection rates in the groups examined were considerably higher than was detected by the single examination.

The pinworm infections of the Charlotte boys were not acquired at camp, as each boy was there for only two weeks. As it takes this parasite longer than two weeks to complete its life cycle, an infection secured at camp would not have been detectable for several weeks after the boy left camp. It must be assumed, therefore, that all infections detected were secured in the boys' usual home environments.

It is well known that infections with ascaris, hookworm and many other helminths are dependent to a large extent upon environmental sanitation and soil pollution habits. Such environmental factors suitable to the spread of worm infections are usually more prevalent among persons of low economic status, especially in rural situations. It appears from our study that pinworm infection is also to a large extent an infection of persons of low economic status, not limited to rural areas, but common in urban situations. The life cycle of this parasite, however, is direct; that is, the eggs passed in the perianal region are infectious, and no development outside the host is necessary as required by hookworm and ascaris. Therefore, personal hygiene and sanitation plays the important role in pinworm infection, whereas excreta disposal and environmental sanitation are important in hookworm and ascaris prevention.

The relationship between personal hygiene, economic status and pinworm infection is indicated by a comparison of the infection rates of the various groups. Our examination of 118 college students failed to reveal a single pinworm infection. These men are from homes of the higher economic levels, and presumably have above average habits of personal hygiene. On the other hand, Cram, Jones, Reardon and Nolan reported 32.8 per cent infection rate among adults of low economic level in Washington, D. C., and Headlee (1935) found 22 per cent infection rate among State Mental Hospital patients in Illinois. The economic status of the latter is unimportant, but their well known lack of personal hygiene accounts for the high infection rate.

It has been suggested that frequent baths may decrease the effectiveness of the swab diagnostic method for pinworms. The failure to find a single infection in the college group might be attributed in part to the frequent bathing of this group. It was noted, however, that anal swabbings from this group collected considerable amounts of debris and feces. If abundant material is present in the perianal region in spite of frequent baths, it appears reasonable to assume that pinworm eggs would have likewise remained to be picked up by the swab. The boys at the Charlotte Observer Fresh Air Camp swam twice daily. The swim was followed by

a shower bath. Despite their frequent baths, 32.8 per cent of this group of boys were diagnosed as having pinworm infections by the swab method.

The failure to find a single pinworm infection in 33 negroes from the Duke University Outpatient Clinic is unusual. The negroes' habits of personal hygiene are such that we could be led to expect a high pinworm infection rate among them. Other workers have reported the adult white pinworm infection rate to be twice that of the negro rate and the white children rate four times that of negro children. Although it is possible that negro personal hygiene may account for these differences in the adult infection rate, it does not appear to be the complete explanation, especially in children. Additional epidemiological investigations are needed to clear up this point. It is quite possible that the negro may be partially immune to pinworm infection as he is to hookworm infection.

Anal pruritus is commonly considered frequently to accompany pinworm infection. Such was not the case in the group reported here. A careful check was made on this symptom, and 6 of the 118 college students complained of anal itching. Yet a single swab examination of these students failed to detect a pinworm infection in this group. Similarly there appeared to be no close correlation between the presence of pinworm and anal pruritus in the boys from the Fresh Air Camp. Only 18.4 per cent of 38 of these boys who were positive for pinworm reported anal pruritus, while 18.1 per cent of the boys who were negative for pinworm complained of this symptom.

SUMMARY

Examination of several groups of persons for the presence of pinworm (*Enterobius vermicularis*) was made with the use of the National Institute of Health swab technic.

Examination of 132 underprivileged white boys from Charlotte, North Carolina, revealed an infection rate of 32.8 per cent.

Sixty-seven white patients from the Duke University Outpatient Clinic had an infection rate of 7.4 per cent. No infections were found in 33 negro patients from this clinic.

Not a single infection was encountered among 118 male students from the University of North Carolina.

REFERENCES

1. Bozicevich, J.: Studies on Oxyuriasis. III. The Incidence of Pinworm Infestation in a Group of 230 Boys in Washington, D. C. Med. Annals District of Columbia, **6**:239-241, 1937.
2. Bozicevich, J.; and Brady, F. P.: Studies on Oxyuriasis. XV. A Study of Five Hundred and Four Boys in a Boys' Camp. Med. Annals District of Columbia, **7**:187-190, 1938.
3. Cram, E. B.; Jones, M. F.; Reardon, L.; and Nolan, M. O.: Studies on Oxyuriasis. VI. The Incidence of Oxyuriasis in 1,272 Persons in Washington, D. C., with Notes on Diagnosis. Public Health Reports, **52**:1480-1504, 1937.
4. Hall, M. C.: Studies on Oxyuriasis. I. Types of Anal Swabs and Scrapers with a Description of an Improved Type of Swab. Amer. Jour. Trop. Med., **17**:445-453, 1937.
5. Headlee, W. H.: Studies on Infections of Human Parasitic Worms Under Institutional Conditions. Jour. Lab. & Clin. Med., **20**:1069-1077, 1935.

LOCAL PROTECTION OR IMMUNITY WITH EVIDENCES OF EXPERIMENTAL APPLICATION*

By WILLIAM H. HARRIS, M.D.

and

SHIRLEY WALTHER, M.S.

New Orleans, Louisiana

By local immunity or protection is meant the resistance of a part or a structure to infection and systemic invasion while the body or host as a whole may present little or no immunity to the same offending micro-organism.

The first observation of this phenomenon was noted over fifty years ago by Fehleisen[1] in 1883, four years after Pasteur's work on general immunity. Fehleisen's observations were made upon local resistance to erysipelas in man and animals. His results were confirmed subsequently by Meierwitch,[2] Rogers,[3] Cobbett and Melsome,[4] and as comparatively recently as 1922 by Gay and Rhodes.[5] These latter found that three weeks following an experimental erysipelatous infection there was present absolute protection against the micro-organism intradermally but no protection was obtained against intravenous inoculation.

Wassermann and Citron[6] demonstrated by the method of Neissin and Wethsberg that the antibody titer following intravenous, intrapleural and intraperitoneal injections of *B. typhosus* conformed proportionately to the area of inocu-

*Read in Section on Pathology, Southern Medical Association, Thirty-Third Annual Meeting, Memphis, Tennessee, November 21-24, 1939.

*From the Department of Pathology, School of Medicine, and the Graduate School of Medicine, Tulane University.

*Partly from thesis of Miss Walther for Master of Science Degree, Graduate School, Tulane University.

*Aided by a grant from the David Trautman Schwartz Research Fund.

lation as shown in the blood serum, the pleural and peritoneal exudates, respectively. They found that the degree of resistance depended not upon the quantity of antibodies in the blood stream, but upon the quantity found locally at the site of the injections. They demonstrated definitely that a local resistance was not contingent upon the systemic reaction. They explained their results by a coined word, "Umstimmung," or a "retuning" of local cells, and referred to the heightened phagocytic activity of such cells. The observations of Romer,[7] Noguchi,[8] Cooper[9] upon abrin, tetanus and pneumococci, respectively, are all confirmatory of local protection. Rivers and Tillett[10] demonstrated that a passive local immunity can be transferred from an immune to a non-immune animal as, of course, is well known in general immunity.

Nonspecificity and Specificity.—As regards the nonspecificity of local immunity, the first extensive work published was that of Pfeiffer and Issaeff[11] in 1894. They found that peptone solution, urine, or broth when injected into the peritoneal cavity of guinea pigs protected the animals from later intraperitoneal inoculation of living cholera vibrios which were ordinarily fatal. A few years later Cobbett and Melsome[4] injected mustard in the skin of rabbits' ears and protected against infection with *Streptococcus hemolyticus*. Freidlander and Toomey[12] and Gay and Morrison[13] showed conclusively that certain nonspecific protective measures are effective in preventing infection or at least will lower the degree.

It is interesting to note in practically all these instances that the protection developed after definite inflammatory reactions had been primarily established. It seems logical to expect that the localized humoral and cellular defensive mechanism would be inhibitory to subsequent infection, in contrast with a normal unprepared area.

The character of such nonspecific protection does not compare in extent with that of the specific type. Tuttle and Cannon[14] and very recently (1938) Cannon and Hartley[15] established quite clearly the contrast of local specific and nonspecific protection. They did this with egg albumen and pneumococci. Having sensitized one group with egg albumen, another was immunized with pneumococci. When these animals and controls were injected with a mixture of egg albumen and virulent pneumococcus, the allergic animals and controls all died, whereas the pneumococci protected animals were almost completely protected. Bull and McKee[16] and later Walsh and Cannon[17 18] demonstrated in rabbits specific local immunity with Type I pneumococcus employed intranasally. The controls receiving killed *B. typhosus* intranasally were not protected against fatal pneumococcal infection, whereas those receiving killed Type I pneumococci were fully protected. They found further, as had Barach,[19] that there occurred type specific protection. A certain amount of general immunity occurred, but this was of a minor degree of efficiency.

Mechanism of Production of Local Immunity. There appears but little conformity of opinion as well as of experimental results on this interesting phenomenon. There are in general four views:

(1) *The Humoral Concept.*—The production of local resistance due to local antibody production on the same basis as Ehrlich's humoral reaction for systemic or general immunity. Bordet,[20] Tsuda,[21] Pacheco and Cannon,[22] and Pacheco[23] from their observations support this explanation. The latter believed that the locally mobilized mesenchymal cells form immune bodies. They feel that this would explain the "Umstimmung" or "retuning" of cells as suggested by Wassermann and Citron.

(2) *The Cellular Concept.*—A local cellular reaction conforming to Metchnikoff's cellular reaction. Gay and Morrison[13] and Friedlander and Toomey[12] attributed their result to clasmatocyte exudate and Cannon found large numbers of macrophages or large monocytes. Menken[24] injected trypan blue and other dyes at the periphery of an inflamed area and found that because of the dense wall of neutrophiles and fibroblasts plus blocked blood and lymph vessels, no dye was able to enter the site of inflammation.

(3) *Combined Humoral and Cellular Concept.*—A combination of these two defensive mechanisms acting locally to the antigenic stimulation. The observations of Cannon and Hartley,[15] Ferguson and Cannon,[25] Catron,[26] and Pacheco[23] favor a combined view.

(4) *Anaphylactic Reaction.*—A local anaphylactic or specific desensitization process. Rich,[27] Zinsser,[28] and Opie[29] have all published reports which tend to indicate an anaphylactic phenomenon as the responsible factor for local resistance. Rich, however, has demonstrated that the

allergic and immune reactions can be clearly separated. We have favored some form of desensitization because of definite evidence of protection obtained within twenty-four hours. We do not believe that specific antibody or cellular response could occur in such a brief time; neither is it likely that a true sensitization could occur so shortly. Our rather general observations upon humoral or cellular factors have not yielded consistent or satisfactory results. Although incapable of proof, we have felt that the local host tissue contact with the specific antigen has created a distinctly resistant tissue or cell change so that the "shock tissue" of the particular area was desensitized or rendered impervious to the living micro-organisms. We have noted in intranasal testing with pollen allergens which gave marked reactions that twenty-four hours later no reaction was obtained with the same allergen.

EXPERIMENTAL

Our first experiments upon local protection were conducted with the pneumococcus and have been in part reported heretofore.[30]

In order to ascertain whether any clear-cut differentiation of local immunity could be demonstrated by mouse protection against pneumococcus Type I, the following experiments were carried out:

The pneumococcus suspensions used for protection consisted of a saline suspension of approximately one billion micro-organisms per c. c. killed with 0.4 per cent formalin. The injections consisted of 0.5 c. c. given 5 times over a period of one week. The living dose was 0.05 c. c. of saline suspension prepared from a twenty-four hour growth. This represented approximately one minimum lethal dose, to which through varied preliminary protection experiments, a proper standardization of ratio was established.

Approximately 150 white mice, hairy and hairless, were employed in the experiments herein reported.

(1) In the first series the protective doses of formalin-killed pneumococci Type I and the lethal dose were given intra-abdominally. These animals survived.

(2) In the second series, the protective doses of formalin-killed pneumococci were given intra-abdominally and the lethal dose subcutaneously. These animals died.

(3) In the third series, the protective injections were administered subcutaneously and the living micro-organisms in the same manner and the animals survived.

(4) In a fourth series, the protective doses were injected subcutaneously and the living dose intraperitoneally. These animals died.

Normal controls as well as those that received injections of the 0.4 per cent formalin saline vehicle alone were used for each series and death ensued following the injection of the living suspensions.

It is interesting to note that in the curtailment of the number of protective injections down to as little as one injection, with a subsequent lethal dose in twenty-four hours, protection had been afforded.

Having satisfied ourselves that definite evidence of local protection by variation of the subcutaneous and intra-abdominal routes had been established, we decided to employ more closely related areas.

(5) In the fifth series, thirty-six mice were employed and divided into two groups: Group A received 0.1 c. c. of the protective vaccine intracutaneously in adjacent areas for five successive days. Group B received the same protective dosages subcutaneously. Of Group A after three days, five received 0.1 c. c. of the living micro-organism intracutaneously and four subcutaneously. Those receiving the lethal dose intracutaneously survived. Those receiving it subcutaneously died. Of Group B, after three days, four received 0.1 c. c. of living micro-organism intracutaneously, while five were injected subcutaneously with the viable suspension. All of this group survived. Controls used for intracutaneous and subcutaneous lethal tests all died.

As can be deduced, the animals receiving intracutaneous vaccine were protected from the lethal dosage administered by the same route, but not when it was given subcutaneously.

Those animals that were protected subcutaneously were not affected by the living dose injected either intracutaneously or subcutaneously.

It would appear that either enough vaccine diffused from the subcutis to the cutis to protect, or that absorption from the cutis was impeded by the subcutaneous injections. Conversely in those protected intracutaneously such phenomena did not occur.

Virus Experiments.—The interesting and extensive work of Shope[31] and of Francis[32] with swine influenza virus, especially because of the

mouse susceptibility, prompted the employment of this virus from the local immunity standpoint.

Dr. Shope, of the Rockefeller Institute, has most graciously supplied us repeatedly with the mouse lung virus. We have met with difficulty in maintaining a high and constant titer of virulence. Although this work has been pursued, in collaboration with Dr. Bacher, for approximately six months, we can, as yet, present only tentative findings.

In brief, we have demonstrated protection by intranasal inspiration of the killed virus to subsequent inspiration of the living virus which proved fatal to controls.

From one to five daily respirations of the killed virus were employed and the lesser numbers seemed as effective. Should the further experiments in this field justify it, a complete further report will be made.

DEDUCTIONS

(1) The observations upon local immunity date back over a half century, nevertheless a more or less constant interest in this phenomenon has been maintained. Intensification of interest and publications has been manifested, especially during the past five years up to the present time.

(2) Independent of the scientific factors that may or may not serve to explain the mechanism, the fact remains that convincing evidence of a local immunity or protection, independent of systemic or general immunity, can be demonstrated.

(3) While our experiments have not included tests for specificity, it seems clearly demonstrated by others that whatever nonspecific local protection may be shown, it does not compare with the high degree of local immunity that can be produced. It would appear from the local viewpoint that the nonspecific evidences are the result of local inflammatory host response.

(4) Naturally, the foremost hope of those who have lately revived, through extensive experimentation, interest in this phenomenon, is that it may be put to some useful practical purpose.

Among the most likely diseases for which such prophylactic protection might be applied are those in which the main route of infection or portal of entrance is through the nasal cavity. These would include meningitis, pneumonia and such virus diseases as certain forms of encephalitis and particularly the baneful disease, anterior poliomyelitis. Since in this latter disease but little of encouragement has been obtained either from the attenuated or killed virus prophylaxis, there is the hope that local protection of the main portal of entry might be afforded by the use of applications of the killed virus intranasally.

REFERENCES

1. Fehleisen: Aetiologic der Erysipelas. Berlin: Fisher, 1883.
2. Meierwitch: Centrabl. f. Bakt., **3**:406, 1888.
3. Rogers, G. H.: Compt. Rend. Soc. de Biol., **42**:573, 1890.
4. Cobbett, L.; and Melsome, W. S.: Jour. Path. & Bact., **3**: 39, 1896.
5. Gay, E. P.; and Rhodes, B.: Jour. Infect. Dis., **31**:101, 1922.
6. Wassermann, A.; and Citron, J.: Ztschr. f. Hyg. u. Infektkr., **50**:331, 1905.
7. Romer, P.: Arch. f. Ophth., **52**:72, 1901.
8. Noguchi, H. J.: Jour. Exper. Med., **9**:291, 1907.
9. Cooper, J.: Jour. Infec. Dis., **38**:491, 1926.
10. Rivers, T. M.; and Tillet, W. S.: Jour. Exper. Med., **41**: 185, 1925.
11. Pfeiffer, R.; and Issaeff: Zeit. f. Hyg. u. Infektronkr., **17**: 355, 1894.
12. Friedlander, S. O.; and Toomey, J. A.: Jour. Exper. Med., **47**:663, 1928.
13. Gay, F. P.; and Morrison, L. F.: Jour. Infect. Dis., **38**: 338, 1923.
14. Tuttle, W. W.; and Cannon, P. R.: Arch. Surg., **30**:243, 1935.
15. Cannon, P. R.; and Hartley, G.: Amer. Jour. Path., **14**:87, 1938.
16. Bull, Carroll G.; and McKee, C. M.: Amer. Jour. Hyg., **9**:490, 1929.
17. Walsh, T. E.; and Cannon, P. R.: Jour. Immun., **31**:331, 1936.
18. Walsh, T. E.; and Cannon, P. R.: Jour. Immun., **35**:31, 1938.
19. Barach, H.: Jour. Exper. Med., **48**:83, 1928.
20. Bordet, J.: Ann. Soc. Roy. L. Sc. Med. et Nat. de Brux., **4**:455, 1895.
21. Tsuda, S.: Virchow's Arch. J. Path. Anat., **247**:121, 1923.
22. Pacheco, G. H.; and Cannon, P. R.: Amer. Jour. Path., **6**: 749, 1930.
23. Pacheco, G. H.: Arch. Path., **13**:868, 1932.
24. Menken, V.: Jour. Exper. Med., **53**:171, 1931.
25. Ferguson, R. L.; and Cannon, P. R.: Amer. Rev. Tuberc., **33**:328, 1936.
26. Catron, L.: Jour. Exper. Med., **61**:735, 1935.
27. Rich, H. R.: Trans. 27. Trans. Nat. Tuberc. Assn., **27**: 149, 1931.
28. Zinsser, H.; Ward, H. K.; and Junning, F. B.: Jour. Immun., **10**:719, 1925.
29. Opie, C. L.: Jour. Immun., **17**:329, 1929.
30. Harris, W. H.: Proc. Soc. Exper. Biol. & Med., **40**:672, 1939.
31. Shope, R. E.: Jour. Exper. Med., **64**:47, 1936.
32. Francis, T. J.: Jour. Exper. Med., **62**:505, 1935.

DISCUSSION (*Abstract*)

Dr. George S. Graham, Birmingham, Ala.—Dr. Harris' evidences for the actual existence of a local immunity it seems are very clear and definite. There are two things that struck me as particularly interesting in his findings. In the first place, it is interesting to see the close immunological differentiation he has been able to draw between the cutis and the subcutis. We should not naturally think of tissue so closely related as these, as being immunologically so distinct.

The second and most interesting thing, it seems to me, is the fact of the development of a local immunity, "local protection," Dr. Harris says, twenty-four hours after the installation of a killed virus or killed antigen. We have been thinking, it seems to me, of this sort of local protection as actually an immunity, and we have been thinking of immunity as a matter that requires time in which antibodies, as we call them, can be built

up. Dr. Harris' protection in this short period, it seems to me, will force us to put another variable into the equation that goes into that whole set-up of protection bodies, whatever they are. The explanation for this local protection is, as Dr. Harris says, another matter.

Personally, I have always been impressed by the work of Amoss a number of years ago. Working with the streptococcus from an erysipelas, he immunized rabbits in the flank, you will remember, and found a local immunity without general evidence of antibodies, but then if he continued his inoculations in the flank he found that his area of immunity gradually spread ventrally, not forward or backward, along the lymphatic lines, and then he found antibodies in the general circulation. That has always seemed to me pretty good evidence of the fact that whereas antibodies in this phenomenon are formed locally, they do eventually get into the general circulation. So I have always felt that a combination of cellular and humoral explanation was perhaps the easiest to see. The tide has swung back and forth between those two elements.

So far as the desensitization is concerned, the allergic line of thought is one that it seems to me is a little hard to apply in this case. I could very much more easily understand a desensitization phenomenon if we were dealing with a non-living antigen. In this case, when we put living organisms into the peritoneal cavity it is not a matter of protecting against immediate attack, but of destroying organisms finally, and it is rather difficult to get an allergic type of reaction sufficient to kill those organisms immediately. However, it is possible that we had the explanation yesterday from Dr. Sabin. I think anybody who listened to her work cannot help thinking, in this business of immunity, of those little, shiny particles that are given off by the macrophages in her experiments. Dr. Harris has already requested that Dr. Sabin tell us how long it takes those local cells to form antibodies. Even if it takes the short time apparent for the shiny bodies to come off the macrophage, there is no reason why the cell during that preliminary period of which she spoke may not be able to develop within itself some sort of protection that will suffice to protect the animal.

Dr. I. D. Michelson, Memphis, Tenn.—A survey of the literature dealing with the subject of local immunity shows that marked differences occur between local and general immunity. The most striking property of local immunity is its fleeting character. Wherever subsequent inoculations were made after the acquisition of local resistance, full susceptibility was regained within a period ranging from four to six weeks.

The exact mechanism governing development of local resistance is still unsettled. Gay found that the intraperitoneal injection of plain broth or other irritants sufficed to produce a local immunity due to the accumulation of monocytes. This was enhanced by the later inoculation of organisms; this investigator also found that local immunity may exist in the absence of a general immunity, for animals recovering from experimental erysipelas, produced by the inoculation of moderately virulent strains, acquired no resistance to intravenous inoculation of the same organisms, but were fully protected when the organisms were administered by the dermal route. On the other hand, immunization by the intravenous route afforded complete protection to subsequent intravenous inoculations, but not against experimental erysipelas.

Cannon showed that the virulence of the strain employed is an important factor in the development of local immunity. He found that when moderately virulent pneumococci are instilled intranasally, the resulting local immunity was dependent upon the presence of monocytes and antibodies in the affected tissues. With highly virulent organisms, a different state of affairs was demonstrable, for the local reaction was not marked; neither was there present the local accumulation of antibodies. In the latter animals, local immunity depended upon the acquisition of a generalized immunity, as shown by the intravenous inoculation of virulent organisms.

To summarize, local immunity depends upon a local accumulation of cells and antibodies in the inoculated tissues. It may be coincident with the development of a generalized immunity. The duration of this tissue resistance is usually from four to six weeks. It can be induced by many different substances, specific and nonspecific. Its importance lies in the possibility that it may afford a mechanism for blocking the entrance of organisms by their natural portal of entry, as was ably brought out by the speaker.

Dr. Florence Rena Sabin, Denver, Colo.—The speed of the processes of digestion within phagocytic mononuclear cells varies greatly according to the substance phagocytized. For example, a macrophage which has ingested a neutrophil can degrade it completely within forty eight hours. On the other hand, the giant cells which form to engulf such inert materials as the waxes from tubercle bacilli persist for months before they break up into their constituent monocytes.

With reference to the speed of antibody formation, the shortest time in which the antibodies were found in the serum after the dye-protein studied by us was four days. Earlier than this period, it seems to me that the reactions are to be considered rather as direct effects of the cells, both neutrophils and macrophages, on the materials they engulf rather than as the effects of the indirect mechanism of antibody formation.

Dr. Lathan A. Crandall, Memphis, Tenn.—I should like to ask a question. When both the protective dose and the living organisms were injected subcutaneously, was the living organism deliberately injected at an area that had not previously been touched by the protective injections?

Dr. R. H. Rigdon, Memphis, Tenn.—The problem of local immunity has reached a point in which it means something definite to me in the problem of inflammation. For instance, if you take a staphylococcus that does not produce toxin and inject it subcutaneously, very quickly there are a tremendous number of polymorphonuclear leukocytes around the bacteria. If you take a toxin-producing strain of staphylococcus and inject it subcutaneously into the mouse there will be very few polymorphonuclear leukocytes in the area. There will be a tremendous destruction of the tissue, apparently as the result of the toxin liberated by the toxin-producing strain of bacteria. If you give staphylococcus antitoxin intraperitoneally and then give the toxin-producing strain of staphylococci, you will find there will be a tremendous number of polymorphonuclear leukocytes in the area.

There is a definite indication from these observations that the antibodies have reached the subcutaneous tissue and have neutralized the toxin which is liberated

by the organism and thus protected the polymorphonuclear leukocytes and probably, as has been mentioned, make it much easier for the leukocytes to phagocytize the bacteria. I think that this paper is a specific illustration in which we can follow very nicely exactly what is happening with regard to the action of antibodies. Furthermore, it is a point worthy of consideration in the study of the development of inflammation. It may be that antibodies resulting from either active or passive immunization may localize and concentrate in areas of inflammation. It is a very fascinating mechanism to consider in the control of a localized infection.

I think we have in Dr. Harris' paper a definite illustration of something that is very, very nice in any consideration of the problem of local immunity, a thing that many investigators have studied without much success. I think now, with these points Dr. Harris has brought out, that we have data to support the early observations on local immunity and to make it a very tangible problem.

Dr. A. L. Joyner, New York, N. Y.—In some of the experiments Dr. Sabin performed in her laboratory prior to the dye-protein experiment, she was attempting to achieve some increased sensitivity to tuberculous proteins by the aid of combining tuberculoprotein and a phospholipid. That work was definitely correlated with the type of reaction of cells found. Animals were injected and so many animals were sacrificed each time, the reactions were studied for their salient character. In those experiments I think it was almost invariable: never were we able to inject a guinea pig the second time without measuring a reaction of increased size. We went on to as many as six injections. The time spacing was three days. I felt almost sure we could have spaced the time one day and been able to see the increased reaction, instead of waiting for the three-day period. This is something we cannot measure in a test tube, but undoubtedly there is the ability of the animal to respond, shall we say, in increased sensitivity? Some workers object to the word "allergy" as used in these experiments. At any rate, the animal had increased ability to respond in the short period of three days.

The observations of Dr. Harris and Miss Walther are very interesting when viewed in the light of Dr. Sabin's experiment.

Dr. Harris (*closing*).—In connection with Dr. Graham's remarks, as regards the question of the bacterial factor, of course, we must remember that they after all are plant life of a minute type and that there exists bacterial sensitivity. Hence it is practical to bring about desensitization just as for higher plant life. In the instance of certain viruses, there is now a question as to whether they are really living organisms. The splendid work being done puts us much at sea as regards the nature of certain viruses, for example, the mosaic disease of tobacco.

The thing that disturbed us a great deal was some of the very early results obtained after twenty-four hours. Time did not permit of review of the literature which has been incorporated in the thesis. In this connection Barach has shown that on the third or fourth day he obtained even specific protection for pneumococci Types I, II, III and IV.

Dr. Michelson brought out some points which I should have emphasized, namely, that the so-called immunity that exists locally is of a more transitory nature than that of true general immunity, which in many instances is quite lasting.

Dr. Crandall asked about the question of the inoculation in the skin. The protective intracutaneous injections were in contiguous areas and the living dose was then put into that particular local area. We know, however, that in Gay's work upon experimental erysipelas he found that the skin as an organ, so to speak, was resistant as a whole.

Dr. Crandall.—I was thinking of immunizing by the subcutaneous, followed later by a living organism injected, both in the same area.

Dr. Harris.—One series of animals received a series of protective doses subcutaneously. Another series of animals received a series of protective doses intracutaneously, and the lethal dose then was crossed and was duplicated for each. We obtained, in the instance of the subcutaneous injections, protection of both intracutaneous and subcutaneous areas, whereas, intracutaneous injections protected only the intracutaneous area and not the subcutaneous zone.

Dr. Crandall.—Was the lethal dose injected in the same area as the previous injections that were subcutaneous?

Dr. Harris.—As I said before, the protective dose was put in contiguous areas, and the killing dose was put in the same area. Contrawise, in the instance of Dr. Gay's work, he found the skin as a whole in erysipelas seemed to be protected.

As regards the skin results, I discussed with Professor Harold Cummings, of our Department of Histology, the comparative blood circulatory distribution in an effort to find why we obtained intracutaneous protection for both, and for the intracutaneous production only protection to the intracutaneous, and not subcutaneous. I think Dr. Sabin has offered a very tangible and satisfactory explanation through her observations on the variant lymph flow. I had realized that the return blood flow may perhaps not be quite so good. We do know, however, that the skin does absorb very readily and permit invasion, as is shown by the tangible example of mercurial inunctions which may bring about salivation.

I listened with great interest to her explanation of the large cells and the time factor involved in her reactions as reported yesterday. In our particular experiments, we used the one injection of 0.5 of one-half billion killed pneumococci and endeavored by various means to obtain tangible information as to the fate of the subsequent living micro-organism injected. We obtained practically nothing from the smear preparations from the peritoneum or the mesentery. I do not believe this detracts from Dr. Sabin's explanation, because it is quite possible that those particular cells *in situ* could do exactly the same thing as after migration. In other words, whether they happen to wander out into the peritoneal or abdominal cavity makes no difference as regards the question of her explanation, and to me it has been a great source of instruction. It suggests that though there has been no evidence of cell reaction or antibody production, nevertheless these killing micro-organisms do not invade beyond the local area.

I think from this whole subject, independent of the technical phases we have presented here and which may

be of interest, the point remains as to whether or not local immunization from a practical standpoint can eventually prove to be of any definite service to us. Very often the revival of interest and activity in old problems, as has occurred for local immunity, brings about some practical usage.

A STUDY OF THE INCIDENCE OF AIR-BORNE MOLDS AND OF SKIN SENSITIVITY TO MOLDS*

By EDNA S. PENNINGTON, M.D.
Nashville, Tennessee

Molds are an important cause of hay fever and asthma. Only air-borne molds which cause hay fever and asthma will be discussed in this paper. These molds, usually non-pathogenic, occur on vegetation, in dust, mattresses and other household articles. The spores are carried through the air. Molds of established pathogenicity, which not infrequently cause allergic disease, will not be considered.

Molds have been recognized as a cause of hay fever and asthma since Van Leeuwen's[1] work in 1924, and their extracts and filtrates have been used for testing and treatment. Van Leeuwen found fungus allergy common in Holland, as many as 50 per cent of asthmatics exhibiting mold sensitivity. In 1935, Fraenkel[2] pointed out that 16 per cent of German patients with asthma were sensitive to fungi and compared this with the higher figure, 53 per cent, which obtained for English patients. Hopkins, Benham and Kesten,[3] 1930, demonstrated conclusively the occurrence in man of specific sensitivity to Alternaria. Bernton and Thom,[4] 1930, and Flood,[5] 1931, demonstrated single instances of sensitivity to Aspergillus fumigatus and Mucor plumbeus.

Very few surveys as to the frequency of fungus allergy have been made in the United States. Feinberg,[6] in 1935, skin tested 243 patients to twelve molds, and 22 per cent of his patients reacted to one or more molds. The scratch method was employed. In 1937, Feinberg,[7] reported 90 consecutive cases of allergic rhinitis due to mold sensitivity, but did not state the number of consecutive allergic patients from whom this group was derived. Lamson and Rogers,[8] in 1936, found that 12.2 per cent of 1,259 patients reacted with positive intradermal tests to one or more of nine molds. Forty-eight per cent of their entire group of 1,259 patients failed to react to any allergens. Grafton Tyler Brown,[9] 1932, used sixty-two different varieties of molds for skin testing. Brown did not record the number of patients studied nor the incidence of skin sensitivity to their allergens.

Studies by Feinberg,[10] 1936, Durham,[11] 1937, and Prince and Morrow,[12] 1937, called attention to the wide distribution of mold spores in the air. Durham, by counting the mold spores on pollen slides exposed at forty different cities in the United States, found that Alternaria spores occurred in the air in large numbers with a distribution somewhat similar to that of ragweed, and in the largest numbers in the wheat and grain growing belts. Many spores of Hormodendrum, Helminthosporium and other molds were found on these slides.

Questions which are still unsettled are the relative frequency of mold sensitivity in various parts of the country and the role such sensitivity plays in hay fever and asthma. Moreover, there is little agreement as to which genera or species of molds may cause sensitivity. It appears that a patient may be sensitive to one species and not to another of the same genus. Thus, Lamson and Rogers found very little overlapping in sensitivity to four different species of Aspergillus. Although many allergists are using mold extracts in routine testing, no agreement has been reached as to what mold genera and species are necessary for skin testing in order to survey adequately mold sensitiveness in any individual in any given locality.

Thus, it seems clear that we do not know which mold extracts to employ in routine testing for mold sensitivity. In testing for foods we employ extracts of all the foods the patient eats. With molds, as with pollens, perhaps we should employ only extracts of those mold spores which occur in large amounts in the air in the region in which the patient lives, and which are known to cause allergic symptoms. Just as pine pollen present in Tennessee in large quantities in early spring is known to be practically innocuous as a cause of hay fever, so certain molds may be innocuous. Certain other pollens, as pecan, seem particularly nocuous. The same may be true of mold spores. It has been pointed out (Feinberg) that mold extracts which contain large amounts of spore material are especially potent allergens. The mycelial part of the mold growth is relatively inactive. What mold spores are most potent as allergens? What mold spores are most

*Read in Section on Allergy, Southern Medical Association, Thirty-Third Annual Meeting, Memphis, Tennessee, November 21-24, 1939.

common in any region at different seasons of the year?

With these questions in mind the observations herein reported were made. A mold survey, using the plate and slide methods, was made in order to define the mold content of the air in this region. The frequency and intensity of mold skin sensitivity in the population of this region was studied.

MOLD SURVEY

For molds to cause allergic disease in any region they must be present in the air in considerable quantity. A study of the mold content of the air in Nashville, a mid-South city, was therefore made. In making the survey we used the commonly employed slide and plate methods.

SLIDE METHOD

Daily mold counts from slides exposed for pollen counting were made in August and September of 1937 and from March to frost in 1938 and 1939. As many spores as possible were identified from the slides: those of Alternaria, Hormodendrum, Spondylocladium, Acrothecium, Helminthosporium and Fusarium were easily identified. As in Durham's survey, Alternaria and Hormodendrum spores were the ones most frequently found (as may be seen in *Fig. 2*).

PLATE METHOD

Plates of modified Sabouraud's media (Difco) which favored mold and discouraged bacterial growth were used. The plates were exposed in the air for 10-minute periods. Colony counts were made after growth had occurred for two or three days at room temperature. Many of the colonies were subcultured and as many as possible were identified. During the past year plates exposed for two-minute periods at two-week intervals were sent to Dr. M. B. Morrow, of the University of Texas, who counted and identified the molds. This work was done under the sponsorship of the Association of Allergists for Mycological Investigation. Mold counts from the plates confirmed the results obtained by the slide method. Alternaria and Hormodendrum predominated, although Aspergilli, Penicillia, Mucors and Rhizopus were frequently found.

Thus, our survey indicates that in Nashville during the months covered by these studies spores of the molds Alternaria and Hormodendrum are present in the air and occur more frequently than Aspergilli, Penicillia, Mucor and Rhizopus. Nevertheless, the latter are frequently encountered.

Alternaria spores occurred in the air in considerable quantity daily during the ragweed season for the three-year period of the study. The number varied considerably. The spores were

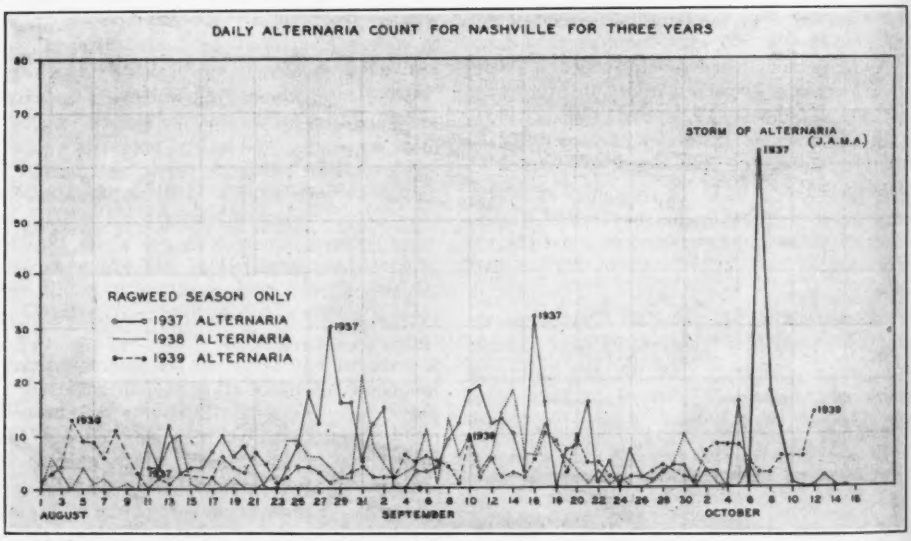


Fig. 1

most numerous in 1937, when the peak, 32 per cubic yard of air, was reached on September 16. On October 7 an unusual number of Alternaria spores, 63 per cubic yard of air, were found. This peak occurred two weeks after Alternaria had almost disappeared. For four days at this time the count was unusually high. The highest Alternaria counts corresponded roughly to the highest ragweed counts, the peak of the season extending from the last week in August to the middle of September. In 1938 the peak count for Alternaria was 21 spores per cubic yard of air, and this occurred August 31. In 1939, the peak occurred on October 12 and was 14 spores

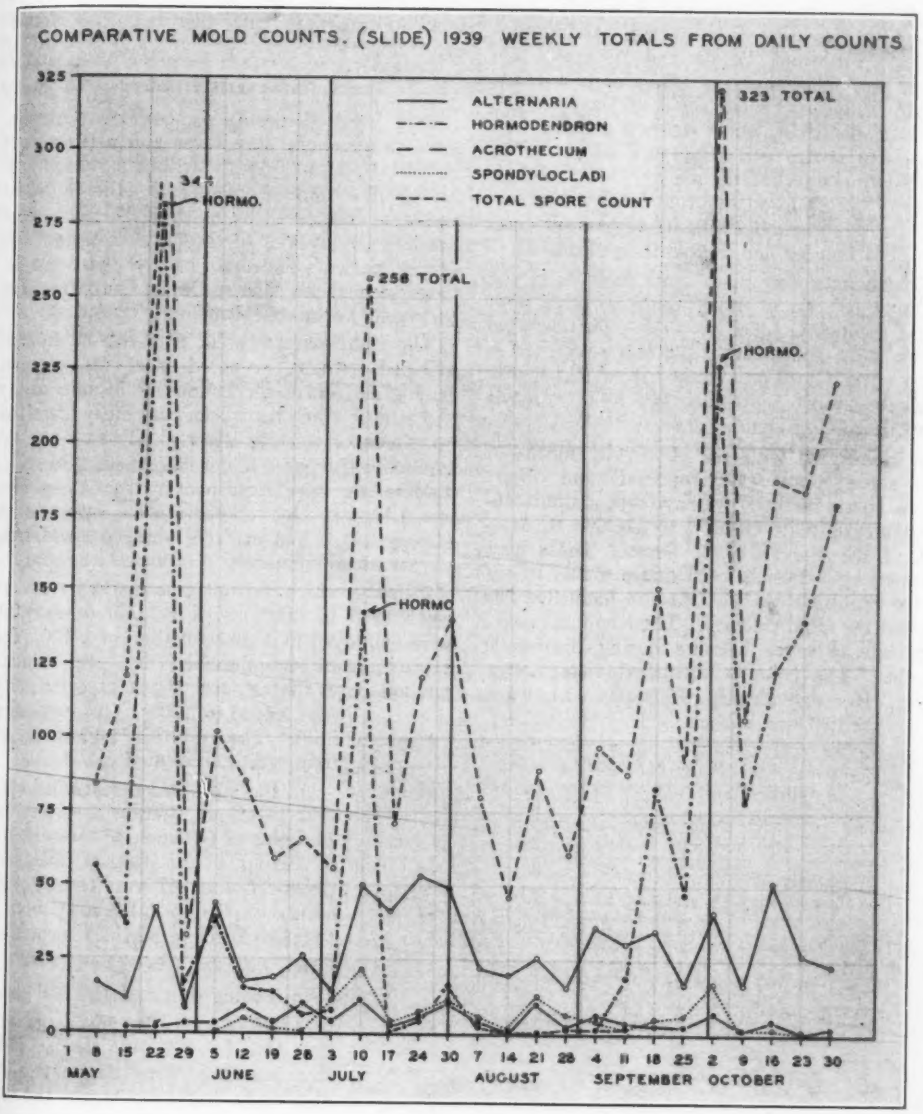


Fig. 2

per cubic yard of air. On August 4, preceding the ragweed season, there were 13 Alternaria spores (*Fig. 1*).

The total mold spore count was made from slides exposed daily from May 1 through October, 1939. The total weekly count was then calculated and plotted on a graph (*Fig. 2*). Hormodendrum, Alternaria, Spondylocladium and Acrothecium were plotted separately; they occurred in this order of frequency. Helminthosporium, Fusarium, Smuts and Aspergilli appeared in smaller numbers. The highest count for any single spore for any day was attained by Hormodendrum, which reached a peak, July 12, of 156 spores per cubic yard of air. The total spore counts for the season (May through October) were: Hormodendrum 1,464 spores, Alternaria 744, Spondylocladium 122, Acrothecium 110, Fusarium 96 and Helminthosporium 83.

Mold counts were made from cultures of the air obtained two or three times weekly, from June 1 through October 30, 1939. The averages of the daily counts were plotted weekly on a graph (*Fig. 3*). These ranged from 10 colonies (week beginning September 11) to 80 colonies (week beginning October 23).

In connection with our survey by means of mold spore counts (slide method) and colony counts (plate method) we have sent at fourteen-day intervals plate cultures to Dr. M. B. Morrow, of the University of Texas. These were obtained by exposing appropriate media to the air for two minutes. Dr. Morrow identified and counted the mold colonies. These counts ranged from one to seven colonies during the winter months. The colonies identified were: Alternaria, Hormodendrum, Rhizopus nigricans, Yeast, Aspergillus Terrus Thom, various sterile mycelia and Penicillium. In May, the Hormodendrum count on one plate was 12, while the Alternaria was 3. Dr. Morrow informs us that this was the highest Hormodendrum count obtained during the month of May from any of the 14 cities in which cultures were made by the Association of Allergists for Mycological Investigation. In June the Alternaria count for one exposure was 7 and there were no Hormodendrum.

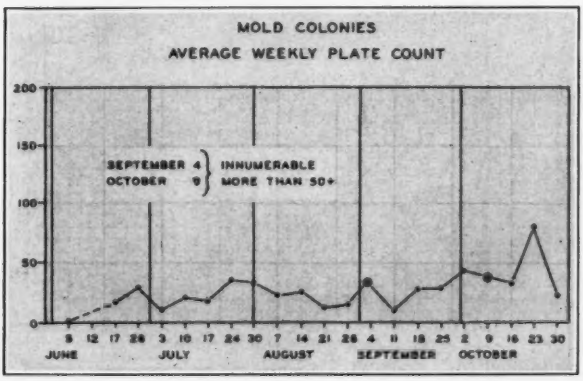


Fig. 3

SKIN SENSITIVITY

Five hundred twenty-six patients with seasonal or perennial hay fever and asthma were tested intradermally with various mold extracts. All of these patients reacted to other allergens and were considered by us to be allergic. Four hundred twenty-four of the patients tested were private patients and one hundred two were patients seen in the Allergy Clinic, Outpatient Department, Vanderbilt University Hospital.

The mold extracts used, fifty-two in number, included extracts prepared from the common genera and species encountered in our survey and others, which have been previously identified as causes of allergic disease. Twenty-one extracts were prepared in our laboratory (Group I). Twenty-one were furnished by the Association of Allergists for Mycological Investigation (Group II). Ten extracts were obtained from a commercial laboratory (Group III) (*Table 1*).

Extracts which did not give marked reactions when used in dilutions of 1-1,000 or 1-10,000 were employed in a concentration of 1-100. The extracts were standardized by the dilution method only, that is, ten grams of dried mold were added to 100 c. c. of extracting fluid. The resulting 1-10 stock extract was then diluted 1-100.

Of the 526 patients studied, 517 were tested to Alternaria, 459 to the 21 molds of Group I, 352 were tested to Group I and the 21 molds of Group II, and 161 were tested to the molds of Group III and Group I. In this latter group 80 were also tested with extracts of Group II.

In reading skin reactions the signs, plus minus (±), one plus (+) and two plus (++) were used. Positive reactions were designated one plus when definitely larger and redder than the plus minus reactions

or the controls. Reactions were recorded two plus (++) which were definitely larger and more intense than the patient's average one plus reactions. Pseudopods were frequently but not invariably present in the reactions considered positive. All plus minus (±) reactions were classified as negatives, even though in a few instances they were considered by us to have clinical significance. Some patients definitely sensitive to molds exhibited only one plus skin reactions. Conversely, as always, occurs with skin tests, a few of our two plus reactions appeared to have no clinical significance.

RESULTS

Of the 526 patients tested, 32.5 per cent gave two plus reactions to one or more mold extracts and 53.4 per cent gave one plus reactions. Thus, 85.9 per cent gave positive skin reactions to molds.

In general, the incidence of positive reactions to the commercial extracts (Group III) corresponded with that to extracts in Groups I and II. The Hormodendrum extract of Group III gave 15 per cent two plus and 48 per cent one plus reactions. Thus a total of 64.5 per cent of all patients reacted positively to this commercial extract. In comparison with 5 other extracts of Hormodendrum, the commercial product produced almost twice as many two-plus reactions and seven times as many one plus reactions. Corn smut gave the next highest percentage of positive reactions among the commercial extracts. Thirty-five per cent of the patients reacted positively to this extract. The extract of corn smut prepared by us, on the other hand, gave a larger number, yielding 45.9 per cent positive reactions.

Among the commercial extracts Penicillium rubrum followed Hormodendrum and smut in frequency of reaction, showing 5 per cent two-plus reactions. Alternaria, Mucor, Cephalothecium roseum, Monilia sitophilia, Aspergillus fumigatus, and Aspergillus niger followed in order, the last of these giving two plus reactions in 1.88 per cent of patients tested. Yeast, which

LIST OF 52 AIR-BORNE MOLDS USED FOR SKIN TESTING IN GROUP OF 526 PATIENTS

Group I

21 Molds of Our Own Extraction

Mucor circinelloides	Penicillium humica	Penicillium (J green)
Mucor plumbeus	Rhizopus I	Penicillium (yellow)
Aspergillus fumigatus I	Helminthosporium	Cephalothecium roseum 1
Aspergillus ochrochus	Cephalothecium	Brewer's yeast
Monilia sitophilia I	Cephalosporium	Fleischmann's yeast
Alternaria I	Aspergillus flavus	Torula
Hormodendrum I	Penicillium rubens	Aspergillus niger I

Group II

21 Molds from the Association of Allergists for Mycological Investigation

Hormodendrum A	Aspergillus glaucus 3 B	Paecilomyces varioti
Hormodendrum B	Penicillium W 15	Aspergillus niger BC 23
Hormodendrum B 6	Alternaria B. MA 9	Penicillium notatum MA 12
Hormodendrum W 16	Penicillium	Penicillium intricatum Thom
Acrothecium	Monoverticillate	Aspergillus niger W 45
Alternaria P 2	Spondylocladium B 12	Rhizopus nigricans S 8
Cheatonium	Alternaria B. H 9	Helminthosporium halodes D
	Smut	

Group III

10 Commercial Mold Extracts Used for Comparison

Mucor	Cephalothecium roseum
Aspergillus fumigatus	Yeast
Monilia sitophilia	Aspergillus niger
Alternaria	
Hormodendrum	
Penicillium rubrum	
Corn smut	

Table 1

was not tabulated with the others, showed an incidence of 11.25 per cent of two-plus reactions, second only to Hormodendrum as a frequent reactor (*Table 2*).

Among the extracts in Groups I and II, the reactions to which were tabulated together, Cephalosporium ranked next to smut as a frequent reactor, showing 6.2 per cent two-plus reactions. Alternaria B. H. 9 ranked third, and then the Alternaria from Group I, followed by Alternaria P. 2 from Group II, Monila sitophilia, Helminthosporium, Cephalothecium roseum, Mucor plumbeus, Alternaria M.A. 9 and Hormodendrum A. Aspergillus niger was the smallest reactor in both groups. Reactions to yeast were listed separately (*Table 3*).

We determined the number of patients who reacted to any of five strains of Alternaria. Of 518 patients tested to one or more Alternaria, 36.9 per cent gave positive reactions. A few patients reacted to all 5 strains, but the majority reacted to one or more and the reactions were about evenly divided among the 5 strains.

We used nine extracts of Aspergillus for testing: two strains of Aspergillus fumigatus, one of which was a commercial strain; four strains of Aspergillus niger, including one commercial strain; one strain of Aspergillus ochrochus, one of Aspergillus flavus; and one strain not fully identified, but which probably was glaucus.

POSITIVE SKIN REACTIONS TO 10 COMMERCIAL MOLDS IN ORDER OF FREQUENCY OF TWO PLUS SKIN REACTIONS

Mold Extracts	Patients Tested Number	Two Plus Reactions Number	One Plus Reactions Number	Two Plus Reactions Per Cent	One Plus Reactions Per Cent	Total One Plus and Two Plus Reactions Per Cent
Hormodendrum	160	25	77	15.62	48.88	64.50
Smut	160	8	48	5.00	30.00	35.00
Penicillium rubrum	160	8	52	5.00	32.50	37.5
Alternaria	159	7	22	4.402	13.83	18.232
Mucor	160	7	50	4.375	31.25	35.625
Cephalothecium roseum	160	7	40	4.375	25.00	29.375
Monilia sitophilia	160	7	34	4.375	20.50	24.625
Aspergillus fumigatus	160	4	28	2.500	17.5	20.000
Aspergillus niger	159	3	18	1.886	11.32	13.18
Yeast	159	18	52	11.25	32.5	43.75

Table 2

Twenty-seven private and 10 clinic patients gave two-plus reactions to one or more strains of Aspergillus. Of this group, one patient gave two-plus reactions to three strains of Aspergillus, 5 gave two-plus reactions to two strains, and 31 gave two-plus reactions to one strain. Thus 37 patients gave a total of 44 two-plus reactions or an average of 1.18 per cent two-plus reactions per person. Three of the 31 patients who gave one two-plus reaction exhibited one-plus reactions to three additional strains, 9 gave one-plus reactions to 2 additional strains, and 10 gave one-plus reactions to one additional strain. These 37 patients exhibited a total of 93 positive reactions to 9 strains of Aspergillus.

The two strains of Aspergillus fumigatus gave 7 and 4 two-plus reactions, respectively. Three of these reactors showed one-plus reactions to the other fumigatus and one other patient exhibited a one-plus reaction to both.

Only one patient reacted to all 4 strains of Aspergillus niger and she reacted also to Aspergillus flavus. The 9 strains of Aspergillus were arranged in order of skin reactivity as follows: Aspergillus flavus (18 positive reactions), Asper-

POSITIVE SKIN REACTIONS TO MOLDS* (GROUPS I AND II) IN THE ORDER OF FREQUENCY WITH WHICH THE MOLD EXTRACTS GAVE TWO PLUS SKIN REACTIONS

Mold Extracts	No. Patients Tested	No. Two Plus Reactions	No. One Plus Reactions	Per Cent Two Plus Reactions	Per Cent One Plus Reactions	Per Cent Total One Plus and Two Plus Reactions
Smut	178	17	64	9.5	35.9	45.5
Cephalosporium	318	20	92	6.3	28.9	35.2
Alternaria B. H. 9	200	12	22	6.	11.	17.
Alternaria I	515	28	94	5.6	18.2	23.8
Alternaria P. 2	212	10	29	4.7	13.6	18.4
Monilia sitophilia	456	20	145	4.4	31.8	36.1
Helminthosporium	406	16	75	3.9	18.4	22.4
Cephalothecium roseum	398	14	114	3.5	28.6	32.1
Mucor plumbeus	379	13	93	3.5	24.5	28.
Alternaria M. A. 9	208	7	28	3.4	13.4	16.8
Hormodendrum A	215	4	72	1.8	33.4	35.3
Smallest reactor of the 42 molds					•	
Aspergillus niger	443	2	48	0.45	9.5	10.
Brewer's yeast	440	11	132	2.5	30.	32.5

*Ten of the forty-two molds (Groups I and II) whose extracts induced the largest number of two plus skin reactions.

Table 3

SKIN SENSITIVITY OF PATIENTS* TO 5 SPECIES (9 STRAINS) OF ASPERGILLUS

Patients	Aspergillus Fumigatus (Group I)	Aspergillus Fumigatus (Group III)	Aspergillus Niger (Group I)	Aspergillus Niger Bc 23 (Group II)	Aspergillus Niger W 45 (Group II)	Aspergillus Niger (Group III)	Aspergillus Ochrochus (Group I)	Aspergillus Flavus (Group I)	Aspergillus Bc 38 (Glaucus) (Group II)
L., Mrs.	—	—	++	+	+	++	—	++	—
**P., Miss	—	+	—	++	++	—	—	—	+
**C., Mrs.	—	—	—	++	—	—	++	+	—
M., Miss	—	0	+	0	0	0	++	+	0
S., Miss	—	0	—	++	+	0	+	—	—
T., Mr.	—	++	—	—	—	—	—	+	++
**M., Mrs.	++	+	+	—	—	+	++	+	+
**P., Miss	+++	+	—	0	0	—	++	+	0
S., Mr.	++	+	—	0	0	+	—	+	0
M., Miss	—	—	—	—	+	++	+	—	—

*Ten of a group of thirty-seven who gave two plus skin reactions to one or more extracts of aspergillus
**These results were confirmed by subsequent tests

Table 4

gillus ochrochus (16), Aspergillus glaucus (12), Aspergillus niger W 45 (AAMI), and Aspergillus fumigatus (commercial) each (11), Aspergillus fumigatus I (10), Aspergillus niger (commercial), Aspergillus niger I and Aspergillus niger Bc 23 (AAMI) (7) (6) and (5) reactions, respectively.

Of the 526 patients studied, 506 were tested to pollen and dust. Four hundred thirty-eight of these gave positive reactions to pollen or dust or both. Only 68, or 13.5 per cent, were not sensitive to pollen or dust, and all but 2 of these reacted to other allergens (*Table 5*).

GROUP OF 526 PATIENTS, 424 PRIVATE AND 102 CLINIC, ARE TESTED TO DUST AND POLLEN

	Private Patients	Clinic Patients	Total Number Patients Tested	Per Cent of Total Patients Reacting
Patients reacting to pollen alone	30	8	38	7.50
Patients reacting to dust alone	102	21	123	24.30
Patients reacting to both dust and pollen	229	48	277	54.74
Patients negative to both dust and pollen	47	21	68	13.43
Patients not tested to dust and pollen	16	4	20	0.03
Total	424	102	526	100.00%

Table 5

DISCUSSION

The skin tests with 52 mold extracts performed on 526 presumably allergic patients suffering from hay fever and asthma yielded a very large number of positive skin reactions. In this connection it should be remembered that this group, unlike similar large groups reported in the literature, is made up entirely of patients suffering from hay fever and asthma, all of whom were allergic. Thus 438, or 86.5 per cent of the patients tested to either pollen or dust or both, reacted positively. By way of comparison, only 52 per cent of patients in the Lamson and Rogers group reacted to other allergens.

We were impressed by the difference in reactivity to different species of the same genus and even to different varieties or strains of the same species. In order to determine if there were completely crossed reactions between all or any species or varieties of one genus, we chose reactions to 9 extracts of the genus Aspergillus for more detailed analysis. We selected Aspergillus for this study because four species of this genus had also been studied by Lamson and Rogers. They found no evidence of completely crossed reactions between any of the four species of this genus studied by them. We have had a similar experience. We observed no completely crossed reactions between the 5 species selected by us, nor between the 2 strains of one species (Aspergillus fumigatus) and the 4 strains of another species (Aspergillus niger). It appeared, there-

fore, that there may be a genus specific as well as a species specific and perhaps a variety specific factor, at least in the species and varieties which we employed in this study.

The importance of the question of completely crossed reactions becomes obvious when it is recalled that the demonstration of their presence would mean that one potent extract of each genus would be sufficient for testing. If reactions between the species of a genus or even between the varieties of a species were completely crossed, it would greatly simplify testing for molds without the danger of overlooking many instances of mold sensitiveness.

Positive skin reactions were obtained in most patients to more than one mold, indicating multiple skin sensitivity. Few patients reacted to molds only, all except two mold sensitive patients being sensitive to other allergens.

CLINICAL SENSITIVITY TO MOLDS

An effort has been made to correlate skin sensitivity to molds with clinical sensitivity. Investigations along this line are in progress and will be made the subject of further study. Many of the patients exhibiting two-plus and one-plus skin tests to molds have been shown to be clinically sensitive. Many have been treated to molds with improvement in the clinical symptoms.

CONCLUSIONS

(1) A large percentage of allergic patients are skin sensitive to air-borne molds.

(2) A large variety of mold spores should be included in the list of possible mold allergens. More investigative clinical work must be done and more widely scattered mold surveys must be made before it can be determined what mold genera and species may be antigenic.

(3) No evidence of completely crossed reactions was found among the species of any mold genus, or even among the strains and varieties of a species.

(4) It is not always possible to evaluate the factor of mold allergy in the production of allergic symptoms; skin sensitivity to molds is usually multiple and coexists with sensitivity to food and other inhalant allergens.

(5) Air-borne mold spores must take their place along with foods, pollens and other inhalants as an important cause of allergic disease.

BIBLIOGRAPHY

1. Van Leeuwen, W. Storm: Bronchial Asthma in Relation to Climate. Proc. Roy. Soc. Med. (Sect. Therap. & Pharm.), **17**:19, 1924.
2. Fraenkel, Ernest M.: Molds and Asthma. Brit. Med. Jour., **2**:68, 1935.
3. Hopkins, J. G.; Benham, R. W.; and Kesten, M. R.: Asthma Due to a Fungus: Alternaria. J.A.M.A., **94**:6, 1930.
4. Bernton, Harry S.: Asthma Due to a Mold, Aspergillus fumigatus. J.A.M.A., **95**:189, 1930.
5. Flood, C. A.: Observation on Sensitivity to Dust Fungi in Patients with Asthma. J.A.M.A., **96**:2094, 1931.
6. Feinberg, Samuel M.: Mold Allergy: Its Importance in Asthma and Hay Fever. Wis. Med. Jour., **34**:254, 1935.
7. Feinberg, Samuel M.: Asthma and Allergic Rhinitis from Molds. Jour. Lancet, Minneapolis, March, 1937, **57**:87, 1937.
8. Lamson, R. W.; and Rogers, Erving L.: Skin Hypersensitivity to Molds. Jour. Allergy, **7**:582, 1936.
9. Brown, G. T.: Sensitization to Fungi. Ann. Int. Med., **6**: 655, 1932.
10. Feinberg, Samuel M.; and Little, H. T.: A Year's Survey of Daily Mold Spore Content of the Air. Jour. Allergy, **7**:149 (Jan.) 1936.
11. Durham, O. C.: Incidence of Air-Borne Fungus Spores. I. Alternaria. Jour. Allergy, **8**:480, 1937.
12. Prince, H. E.; and Morrow, M. B.: Molds in the Etiology of Asthma and Hay Fever with Special Reference to the Coastal Areas of Texas. Sou. Med. Jour., **30**:754, 1937.

DISCUSSION (*Abstract*)

Dr. Homer E. Prince, Houston, Tex.—The most pressing problem in mold allergy is not further proof of the allergenic importance of molds in general, but rather critical and detailed studies of geographical distribution, seasonal incidence and immunologic relationships of the many generic groups and individual species. The problem is the more acute because physicians are not primarily mycologists, and they must depend for their mold allergens upon their own efforts, commercial houses or collaborating mycologists. Homemade mold extracts are about what their name implies, usually a lot of trouble and eventually inadequate. Commercial extracts are better; at least they should run true to label. However, there is no definite evidence as yet to indicate that molds are species specific, which, in my mind, accounts for many conflicting diagnostic and therapeutic observations.

Is it not logical to expect that mold extracts made from cultures secured at a distance might not represent the specific flora at hand, and so give false negative or false positive reactions, either of which might prove disappointing? Fortunate indeed is the worker with adequate expert assistance to prepare his own local cultures into extracts as he needs them.

I am in complete agreement with Dr. Pennington's observations that mold reactions suggest a lack of generic specificity in many instances. Just how narrow this specificity will have to be drawn, or whether even culturally identical species are immunologically identical, is still an open question. The mold study group is at this time preparing antigenic material for anaphylaxis and other experiments on this point. If generalizations

could be drawn, the problem would be simplified, as Dr. Pennington has implied. Otherwise, an exhaustive list of testing extracts or of carefully selected polyvalent mixtures will have to prevail.

Dr. Pennington has reported a very high percentage of mold reactions, which is approximately 25 per cent higher than the 68 per cent I reported before this Section a year ago. However, one does not have to take the attitude that such a percentage of patients require mold therapy. I rather feel that a high percentage of patients in localities of high mold concentrations are mold-sensitive in some degree, at least by skin test. If a consideration of more obvious food and inhalant allergens is not sufficient to relieve, or at least to explain, clinical symptoms, the possibility of clinical significance of reacting molds presents itself. In our practice, it is routine to recheck all mold reactions and employ only those for therapy that give repeated reactions. This attitude is entirely in keeping with the concept of the multiplicity of allergens in the individual case.

I think we have two patients receiving nothing but mold extracts and I would estimate off hand that about 40 per cent of our inhalant patients are treated with other allergens plus molds.

At this point I could quote a case or two in point, particularly a man whom we worked with for about two years. We treated him with dust and orris root and about starved him and did not get very good results. He came in at the height of the ragweed season this year with his usual complaint. We felt we had overlooked a ragweed case and applied the appropriate testing, with negative results. We started his house dust and orris root again, and in a few days we finally thought we had better run him out on some new mold extracts we had put on the testing tray, and we had nice reactions to hormodendrum and paecilomyces, which is a subgroup of the Penicillium family. Within three or four days, he came back and said: "Doctor, give me some more of those two that gave such nice reactions."

We discontinued everything else and at the present time the man is having no trouble.

Dr. Pennington has mentioned the frequency of reactions to hormodendrum and alternaria in skin testing. The presence of considerable hormodendrum in Nashville was suggested in the study of plates exposed there in May of 1939 when that section had the highest hormodendrum count found at any other section in the mold survey.

If Dr. Pennington has reported mold reactions that seem high, or if the hormodendrum reactions are influenced by the particular extracts, that is, the Group III, or commercial group, it might be that passive transfer testing would be helpful. I should like to ask her if she has done the transfers, and what her conclusions have been.

Dr. Pennington (closing).—In answer to Dr. Prince's question, we have done passive transfers on some of these patients, but we are not ready to draw any conclusions from those tests as yet.

CONGENITAL OBSTRUCTION OF THE BLADDER NECK*

By WILMER L. GRANTHAM, M.D.
and
R. CARL BUNTS, M.D.
Asheville, North Carolina

Although the current literature contains only an occasional case report of congenital obstruction at the bladder neck, we believe that most urologists and many general physicians have encountered at least one case of this not uncommon condition. At the same time, we feel that many cases are going undiagnosed, first, because of failure of physicians to recognize them, and secondly, as Grant[1] says, because

"it is difficult to impress mothers and the general physician with the fact that such evidences of obstruction as frequency, enuresis, infection and gastro-intestinal symptoms are not a natural heritage of infancy."

The commonest causes of congenital obstruction at the bladder neck are valves, fibrosis and hypertrophy of the verumontanum.

Valves are said to be the commonest cause of congenital obstruction. They have been classified by Young[2] into three types:

(1) The infra-montanum type, in which the leaflets arise from the anterior or distal portion of the veru and extend downward and laterally to the urethral walls.

(2) The supra-montanum type, in which the leaflets arise from the posterior or proximal tip of the veru, extending upward and laterally towards the bladder neck.

Both Types 1 and 2 may contain only one leaflet. Type 2 may have several projections extending upward to the internal sphincter.

In Type 3, the iris-valve type, the membrane is attached to the urethral wall throughout its circumference, but usually not touching the verumontanum.

Young,[3] in 1912, was the first to report observation of this condition cystoscopically. Since that time, 175 cases have been reported, Campbell[4] having the largest series of 63 cases.

So-called congenital contracture of the bladder neck, or submucous fibrosis of the bladder outlet as classified by Campbell,[5] and hypertrophy of the internal sphincter as recently de-

*Read in Section on Urology, Southern Medical Association, Thirty-Third Annual Meeting, Memphis, Tennessee, November 21-24, 1939.

scribed by Hendrickson and Simon,[6] is in our opinion of much more frequent occurrence than congenital valves. Young, who studied 355 cases of bladder neck fibrosis in adults, was led to believe from the history that 20 were congenital. Grant believes that many cases are overlooked during cystoscopic dilatation of the urethra. This happened in one of our cases (*Case 5*).

Both Campbell, Hendrickson and Simon present histologic evidence that this condition may be either a fibrosis or a hypertrophy and hyperplasia of the internal urethral orifice. All are agreed that the condition is congenital and not due to an infection such as prostatitis.

The fibrosis may include the entire diameter of the bladder neck with some fibers extending into the trigone, or it may involve only the portion between five and seven o'clock, giving rise to a median bar formation, hypertrophy and hyperplasia being most often confined to this area.

Congenital hypertrophy of the verumontanum was first reported by Bugbee and Wollstein[7] in 1923. They reported eight cases. There is a true hypertrophy of the muscular tissue that sometimes fills the entire urethral canal.

Etiology.—All of these lesions are of congenital origin. The theories as to the formation of valves are well reviewed by Hinman[8] in his textbook. Contracture of the bladder neck and hypertrophy of the verumontanum are true fibrosis and hypertrophy, and are free from infectious origin.

The pathology, symptoms, diagnosis and treatment are similar in all and will be briefly reviewed.

The changes in the lower urinary tract behind these obstructions consist of dilatation of the urethra, hypertrophy of the trigonal musculature and the intra-uteric ridge with sagging of the bladder musculature behind, forming a deep pouch. The ureteral meatuses are often the "golfhole" variety and marked trabeculations and cellule formation are present. In a large percentage of the cases diverticula are found. The bladder wall first undergoes hypertrophy and later dilatation.

If the condition exists long enough without treatment, ureteral reflux occurs with dilatation, elongation and tortuosity of the ureter. The kidney pelves and calyces are dilated and there is a replacement of the parenchymal tissue so that sometimes it is less than 1 cm. in thickness. This is a true pressure atrophy and the glomeruli change is not very marked.

Symptoms.—The most frequent complaint not of the child, but of the mother, is bed wetting. This occurred in all five of our cases, being the primary symptom in four. This is due to an incontinence of overflow by a fixation of the bladder neck, with elevation of the trigone, as is most often seen in contracture of the vesical outlet. Dysuria and straining on urination as found in four of our cases are due to a diminution in the caliber of the urethral canal.

A suprapubic mass is observed quite often by the patient or by the mother, although in one of our cases (*Case 3*) the mother and examining physician had never noticed a bladder which contained 800 c. c. of infected urine. Patients who have had a long-continued complete retention with ureteral reflux sometimes complain of pain in the flanks and the presence of large masses is at times noted. Infection usually occurs in every case; chills and fever with other symptoms of a pyelocystitis may be present. As the condition progresses and there is a loss of renal secreting tissue, the signs of uremia appear, such as drowsiness, dehydration, loss of appetite and other gastro-intestinal symptoms, and finally neurologic manifestations followed by death in uremic coma or urosepsis.

The diagnosis is usually made by the history and physical examination and proven by cystoscopic and urographic studies.

On physical examination, the patient is usually anemic, dehydrated and poorly developed. At times, there is some other congenital anomaly that will be noted on physical examination; as in two of our cases (*Case 2* and *Case 4*) the blood pressure may be elevated. The bladder in most cases is palpable and tender, urinalysis shows considerable pus, the phenolsulfonphthalein excretion is diminished and the blood nonprotein nitrogen is elevated. Cysto-urethroscopic inspection reveals the type of obstruction and the condition of the lower urinary tract. Intravenous urography and cystography are most beneficial in showing the amount of damage that has taken place in the upper urinary tract and bladder, therefore guiding us as to the best therapeutic and surgical approach.

These anomalies at the bladder neck must be differentiated from congenital polycystic kidneys, chronic interstitial nephritis, obstruction by calculi, spina bifida, congenital urethral stricture, adenoma at the bladder neck and neurologic and neuromuscular dysfunctions of the bladder. All of these may easily be ruled out by a complete urologic examination.

The prognosis depends entirely upon the amount of damage that has taken place in the upper urinary tract. If these patients can be seen before ureteral reflux has occurred, their chance of a good functional and systemic result is excellent. If bilateral reflux with greatly dilated atonic ureters and kidney pelves is present, the condition may be entirely hopeless.

In treatment, first preliminary drainage must be carried out until there is stabilization of the renal and vascular systems. This is dependent upon many factors such as the amount of residual urine, the ability to introduce a catheter, the condition of the mid and upper urinary tracts and the functional capacity of the kidneys. Most urologists are of the opinion that gradual decompression should be carried out in advanced cases. In cases that have only two to three ounces of residual urine, an indwelling catheter is not necessary. Many cases require suprapubic drainage, and bilateral nephrostomy is occasionally necessary and should, we believe, be used more often, especially in the long-standing case with large dilated tortuous atonic ureters. One of our cases (*Case 2*) had bilateral nephrostomy and we believe that in two others (*Case 1* and *Case 3*) this procedure may become necessary. During this preliminary drainage period, fluids should be forced and the secondary anemia which is often present should be treated. Urinary antiseptics may or may not be used.

Treatment of the local condition can be carried out without any particular danger if the patient has become completely stabilized through continuous drainage. Young, in 1913, was the first to destroy valves by the punch method. The perineal approach with destruction of the valves through the open urethra was used several years ago by Hinman and Kutzman.[9]

Lowsley and Kirwin[10] and many others have used fulguration of the valve leaflets. Campbell prefers the miniature cutting loop for excision of the valves. Forcible dilatation with sounds or divulsion with the finger through a suprapubic wound has been used by Hamer[11] and others in several instances. Suprapubic removal of the offending obstruction is the operation of choice and necessity in many cases.

Fibrosis, hyperplasia and hypertrophy of the bladder outlet are best treated when possible by transurethral resection with or without preliminary cystostomy. Many cases in which cystostomy has been advisable for drainage may be treated by removal of a wedge-shaped piece of tissue from the bladder neck through the suprapubic opening.

Hendrickson has devised a fine wire loop which will remove very small pieces of tissue. To prevent urinary fistulae in the female infant, he infiltrates the bladder neck through the vagina with a small amount of salt solution.

Many operators treat the hypertrophied verumontanum by fulguration, but we agree with Campbell that complete removal by the cutting current is probably a more satisfactory procedure.

In the cases to be presented, *Case 1* (fibrosis of bladder neck), was treated by suprapubic cystostomy and transurethral resection.

Case 2 (supra-montanum valves) by bilateral nephrostomy, indwelling urethral catheter and transurethral resection.

Case 3 (hypertrophy of the verumontanum and hypertrophy of the bladder neck) by indwelling catheter and transurethral excision.

Case 4 (fibrosis of the bladder neck) by suprapubic cystostomy and electro-excision suprapubically.

Case 5 (hypertrophy of internal sphincter) by transurethral resection.

CASE REPORTS

Case 1.—A white male, aged 16, entered the hospital on March 29, 1936, with a chief complaint of bed wetting. He stated that a year and one half before this, his urine became milky in color and he had burning and frequency of urination. Since that time he has been wetting the bed every night and noticed some difficulty in passing his urine. He also complained of headache for the preceding three months. He had lost 20 pounds in weight during this period. He was told by his local physician that his bladder was paralyzed.

Examination showed a somewhat undernourished boy, the pulse rate 120, blood pressure 118/80. There was some suprapubic area dullness and tenderness, and the nonprotein nitrogen was 75 mg. per 100 c. c. Phenolsulfonphthalein excretion was 20 per cent in two hours. An indwelling catheter was inserted and 6 ounces of infected urine withdrawn. Because of the uremia, suprapubic drainage was instituted on April 7, 1936. An excretory urogram on April 30 showed very poor concentration of the dye until the 90-minute plate, which revealed bilateral hydronephrosis and hydro-ureters more marked on the right. Under suprapubic drainage his condition improved markedly. By June 5, 1936, he had gained 30 pounds in weight and inspection of his bladder revealed a definite fibrosis of the bladder neck with a Grade 4 acute cystitis, trebeculation and cellules. This bar was resected June 25, 1936. Intravenous urograms on July 11, 1936, did not show much improvement. On February 3, 1937, the tube was removed. Personal communication with the patient on April 1, 1938, revealed that his condition is much improved.

Fig. 1, Case 1
Excretory urogram, 90-minute plate. Note widely dilated and tortuous ureters.

He says that he has gained 40 pounds in weight and is voiding without difficulty.

Case 2.—A white man, aged 26, was first seen September 16, 1936, at which time he said that he had been sick for the past eight years, having had an operation on his bladder in 1930 for incontinence and dribbling on urination. Further inquiry into his past history revealed that he had had backache, discomfort in the scrotum, headaches and considerable difficulty in passing the urine. He felt fairly well for one year after the bladder operation in 1930. He further said that he was chronically constipated, his appetite was poor, he was drowsy, had frequent muscular twitchings over the entire body, and had lost 23 pounds of weight in the previous year.

Examination revealed a drowsy, very anemic, sallow, poorly nourished boy with continual muscular twitchings over the entire body. There was an anomaly of the left ear which had been repaired. His skin was dry, blood pressure 130/94. There were two scars over the lower mid-quadrant. His bladder was palpable to the umbilicus. His left epididymis was slightly swollen and tender. The reflexes were hyperactive. The bladder was emptied of 800 c. c. of purulent urine. The nonprotein nitrogen was 69.2 mg. Phenolsulfonphthalein excretion was only 10 per cent in two hours; 8 per cent of this appeared in the second hour.

A cystogram made in 1932 showed a markedly irregular bladder outline. There was bilateral ureteral reflux, the ureters being greatly dilated and tortuous. Cystoscopic inspection revealed two dense bands extending from the posterior portion of the veru, attaching themselves to a fibrous bladder neck on either side. The intra-ureteric ridge was greatly enlarged. There were three diverticula seen, all on the post-lateral walls. The ureteral meatuses were seen to open just to the inside of diverticula on each side. Multiple cellules and trebeculations were noted throughout the bladder. Excretory urograms showed no dye to be present in any plate up to 90 minutes.

Fig. 2, Case 2
Cystogram 1932, markedly irregular bladder outline with diverticula. Bilateral ureteral reflux dilated and tortuous ureters.

Fig. 3, Case 2
1937. Contrast media injected through nephrostomy tube.

Fig. 4, Case 2
Cystogram 1938. Nephrostomy tubes have been removed. Note absence of reflux; bladder less irregular.

Fig. 5, Case 3
Excretory urogram, 60-minute plate. Bilateral hydronephrosis, bladder extending to second lumbar vertebrae.

On September 18, 1936, left nephrostomy was carried out and on October 23, 1936, right nephrostomy was done. His condition improved and he was discharged on November 15, 1936, with indwelling nephrostomy tubes. The patient returned to the hospital on August 4, 1937, stating that he had gained 30 pounds in weight, passing his best weight of 140 pounds by seven pounds. His phenolsulfonphthalein excretion was 62 per cent in two hours, nonprotein nitrogen 45 mg. per 100 c. c. X-rays made at this time by injection of the dye through the nephrostomy tubes revealed large hydronephrotic kidneys, but there had been rather marked improvement in the caliber of the ureters and they were not so tortuous. A transurethral resection of the fibrous leaflets and of the fibrous intra-uteric ridge was carried out. After this, both nephrostomy tubes were removed. He was last seen May 15, 1938. There was no residual urine. He had been attending business college and had gained 39 pounds. His nonprotein nitrogen was 41 mg. per 100 c. c. A combined phenolsulfonphthalein showed a 65 per cent return of the dye in two hours. There was a moderate amount of pus present in the urine. A cystogram made at this time, to our surprise showed no reflux to be present and the outline of the bladder was less irregular.

Case 3.—A white boy, aged 7, seen July 10, 1937, complained of difficulty and straining on urination, with bed wetting. Three months previously the urine was checked by the family physician, who found gross pus, which did not clear up with any remedy.

Examination showed a well-developed and nourished boy, the only positive finding being a pyriform mass that had its origin in the pelvis, extending up to the umbilicus. This was tender only on deep pressure and had not been noted by the family physician or mother. The urine showed gross pus and nonprotein nitrogen of the blood was 36 mg. per 100 c. c. The phenolsulfonphthalein was 65 per cent in two hours. Bladder residual was 800 c. c., which was slowly withdrawn. On cystoscopic examination the verumontanum was greatly enlarged. Just superior to this there was a small fibrous bar present. Both ureteral meatuses were gaping, being about 6 mm. in diameter.

Cystogram showed the bladder to be markedly enlarged. There were no definite diverticula seen. Cystogram taken later with only a small amount of dye used showed two diverticula, one on each side of the bladder. No reflux was present. Intravenous pyelograms showed bilateral hydronephrosis, the dye not appearing in sufficient quantity to cast a diagnostic shadow until the 60 minute plate.

On August 6, 1938, the veru and a small part of the internal urethral sphincter were removed with a miniature McCarthy loop through a small Braasch cystourethroscope, all preliminary treatment, such as indwelling catheter, having been used. There was one ounce of residual bladder urine at the time of his discharge August 15, 1939. Excretory urograms taken before discharge did not show any improvement in the kidney function. He was seen two months following this, at which time there was no bladder residual. He had gained 15 pounds in weight and was attending school. There was considerable pus in the urine. A specimen received from his parents in October of this year showed much less pus to be present, and they say that he is in such good health that they do not feel he needs further treatment.

Case 4.—A white boy, aged 10, was first seen September 8, 1938, complaining of complete urinary retention. Three weeks previous to this, he had an appendectomy, at which time the operating surgeon found a mass in the suprapubic region which was thought to be a distended bladder. On further questioning, it was found

he had never been able to void normally. His urine had always dribbled and he had never been able to pass a stream. Bed wetting had occurred since birth.

Examination showed a badly deformed child, who was very anemic in appearance. His teeth were very irregular, the chest barrel-shaped, the left leg was shorter than the right, and he walked with a definite limp. The fingers were clubbed, skin dry, tongue dry with a thick whitish fur. A scar in the right lower quadrant was not entirely healed, and the bladder was distended half way to the umbilicus. Prior to his admission attempts had been made by several physicians to catheterize him. On admission an attempt was made to introduce a catheter and sounds with the aid of filiforms, but it was impassable, obstruction being met in the region of the prostatic urethra. A diagnosis was made of congenital obstruction at the bladder neck, probably a contracture or valves. Cystostomy was immediately carried out, as the patient had not voided in 24 hours. No laboratory tests were made at this time. Two weeks following the introduction of the suprapubic tube, the bladder was opened and under direct vision with the aid of a cutting loop, a wedge of tissue was removed, after which it was possible to introduce a urethral catheter, which was left indwelling. He was able to leave the hospital two weeks after this operation, at which time he was voiding without difficulty. Laboratory studies following the cystostomy showed the urine to contain gross pus. The phthalein was 75 per cent in two hours, blood calcium 8 mg. and phosphorus 3.5 mg. X-ray of the bones led to an impression of either a congenital lues or renal hyperparathyroidism. The former was ruled out as the mother, father and patient's blood Wassermanns were negative on repeated occasions. A cystogram showed a markedly irregular bladder outline. Reflux was not present.

Fig. 6, Case 4
Cystogram markedly irregular bladder outline with many cellules and minute diverticula.

The patient was seen November 8, 1939, having gained several pounds. His general appearance was much better. No residual urine was present. The urine contained 10-20 pus cells per high power field.

Excretory urograms showed there was some delay in the appearance of the dye, especially on the left side, with definite evidence of a hydronephrosis on this side.

Case 5.—A white man, aged 27, was first seen in

Fig. 7, Case 4
Excretory urogram, 30-minute plate bilateral hydronephrosis. Note bone skeletal changes.

Fig. 8, Case 5
Excretory urogram, beginning dilatation of lower third of ureters. Early hydronephrosis.

April, 1937, at which time he gave a history of painful and frequent urination with enuresis over a period of two years. At that time he said that he was passing urine every three to five minutes. Genito-urinary examination showed tenderness over the bladder region. Cystoscopic examination showed a markedly contracted bladder with ulceration in several areas. The urine contained gross pus. Blood chemical and Wassermann tests were normal, as were the kidney functional studies. He was treated over a period of two years with fulguration on five occasions of bladder ulcers, as we felt that he had an interstitial cystitis. In January, 1938, a large portion of the dome of his bladder was resected, but without benefit. In early October, 1939, further studies were made, an excretory urogram showing definite dilatation of the distal ends of both ureters with slight hydronephrosis of the right side.

A more detailed examination of the bladder neck revealed it to be very tight with a slight fibrous elevation of the urethral sphincter between five and seven o'clock. This was resected, no preliminary preparation being necessary. At the time of operation the fibers could be seen to separate when a piece of tissue was removed. It has been only two months since this procedure was carried out, but there has been an almost complete disappearance of the terrific pain on urination, his frequency is much less, bladder capacity has increased and general improvement has been marked.

BIBLIOGRAPHY

1. Grant, Owsley: Trans. Southeastern Branch, Am. Urol. Assn., 1937.
2. Young: Practice of Urology, Vol. 2. Philadelphia: W. B. Saunders Co., 1926.
3. Young, Frontz and Baldwin: Jour. Urol., **2**:289, 1919.
4. Campbell, Meredith: Pediatric Urology, Vol. 1, Chp. 3. New York: The Macmillan Co., 1937.
5. Campbell, Meredith: J.A.M.A., **94**:1373-78, 1930.
6. Hendrickson, F. C.; and Simon, Karl: Jour. Urol., **42**:140, 1939.
7. Bugbee and Wollstein: Jour. Urol., **10**:447, 1923.
8. Hinman's Principles and Practice of Urology. Philadelphia: W. B. Saunders Co., 1935.
9. Hinman and Kutzman: Jour. Urol., **14**:71, 1925.
10. Lowsley and Kirwin: Jour. Urol., **31**:497, 1934.
11. Mertz and Hamer: Jour. Urol., **39**:548, 1938.

DISCUSSION (*Abstract*)

Dr. Owsley Grant, Louisville, Ky.—There are just one or two points about this type of obstruction that I think are important for us to emphasize: first of all that it is a less common thing than we would ordinarily expect. When one thinks of the embryology of the urinary tract, and that practically all the things which remain to obstruct it in childhood are the result either of a faulty fusion, such as occurs between the glomerulus and the tubules, or later between the genital tract and the urinary tract below, and as a result of that that there are many vestiges left, such as the valves which are not properly absorbed, and such things as the large number of renal arteries which occur in the undeveloped fetus that are finally absorbed, it really seems that it is remarkable that there are not more of these lesions. I think one of the sad commentaries upon our particular profession is the fact that the original study and the incentive to it were found more at autopsy than in clinical observations.

In diagnosis of these cases, there are two or three things particularly to be remembered. First of all, there is the fact that has been emphasized by Dr. Grantham, that these conditions are frequently accompanied by other evidences of abnormal development. Campbell, I think, quotes something like 20 per cent of changes in the valves in the urethra as being accompanied by such lesions as spina bifida.

It is important that these things be recognized promptly if the patients are to have any sort of tenable outlook on life. There is not alone the immediate effect that occurs from congenital obstruction in which the child is brought to us and something must be done for it within the first few months, but there are two more or less delayed effects, one of which manifests itself when the patient has reached the age of 6 or 8 years. A minor obstruction may not be discovered until later in life, even in adolescence. Their characteristic signs and symptoms should be discovered early in life if they are to be corrected.

Just one other point is the difficulty even to urologists themselves in the matter of making the diagnosis. The picture that is presented here, I think, would give the impression that it is practically always a large dilated bladder that brings about the difficult end results. This is not quite correct. In some of the obstructions that we have seen the bladder has been so compensatorily hypertrophied that it is smaller even than is the normal bladder of the child, and the enuresis that develops is one of constant inability to hold even a small quantity of urine.

Another difficulty in our cases most certainly is the fact that with the water distention of the cystoscope the valves and the contracting bar are ironed out so that they frequently present no definite visual picture, and the condition can be very easily overlooked. The one bright spot in this whole problem is the fact that children with renal disease, and of course it is the renal disease that is of importance to us, recover extraordinarily rapidly after proper treatment has been given them.

The kidney is the thing we are concerned with, and in these cases that have progressed either in very early childhood or very early adolescence, nephrostomy is the primary procedure of importance and one that I think we neglect in our endeavor not to do any more surgery than is necessary. I think we all fail to do what is the most vital thing.

Dr. Russell A. Hennessey, Memphis, Tenn.—A discussion of the subject of congenital bladder neck obstructions constitutes essentially a review of the principles involved in adult prostatism, which have been well elucidated by urologists in the past two decades. The rapidly devastating effect of urinary stasis due to congenital obstructive lesions involving the lower urinary tract has been especially evident to us, through finding in several cases most extensive renal destruction in earliest infancy. To be sure, it is not uncommon to demonstrate evidence of obstructive uropathy complicating much more common lesions, such as congenital meatal atresia, phymosis or urethral calculi.

The principles of treatment likewise are for the most part those involved in the treatment of the adult suffering lower urinary tract obstructive lesions. It has been our unfortunate experience in six cases of congenital vesical neck obstructions observed by us to find that extensive renal damage had already occurred, demanding, rather than the immediate correction of the obstructive lesions, treatment designed to revive renal function. In these instances, because the disordered

ureteral dynamics occurring in the dilated and tortuous ureters could not be depended upon to drain the existing hydronephroses, nephrostomy seemed most appropriate and dependable. In one case, suprapubic drainage had already been used, but proved entirely inadequate in providing complete and satisfactory drainage. If and when sufficient restoration of renal function with dissipation of the existing urosepsis may be accomplished, correction of the obstructive uropathy may be quite safely done by one of the several methods that have been suggested by the essayist.

The cautery punch of Caulk in our hands has proven a most satisfactory method in instances of urethral valves or the more common disease involving the neuromuscular apparatus with secondary fibrosis in a spastic internal vesical sphincter which has appeared to be a common cause of vesical obstruction. Bugbee and Wollstein have demonstrated a number of cases with hypertrophy of the veru, some of which we have found in association with enuresis, but not seemingly responsible for examples of advanced obstruction. By demonstrating the rapid renal destruction frequently resulting from low obstructive lesions, a good will campaign amongst the pediatricians may bring about an opportunity to investigate many more cases of early obstructive uropathy which suggest their presence only by the common symptoms of enuresis or an unyielding and persistent pyuria.

A PRACTICAL GRAPHIC METHOD OF RECORDING LEG LENGTH DISCREPANCIES*

By J. WARREN WHITE, M.D.
Greenville, South Carolina

The need of a method for the practical recording of leg length discrepancies became apparent as soon as I embarked on the various growth studies that have interested me for the past ten or a dozen years. The recording of the length of the leg by measuring with a tape line from the anterior superior spine to the internal malleolus appeared to be far too inaccurate for true scientific investigation and was too liable to be unconsciously varied by the biased measurer. In addition, the tape line method of measuring leg length is not exact, as it does not actually measure the length of the leg, but only measures the distance from one bony landmark above the leg itself to another bony landmark, which is not at its extremity. This tape line method also depends for its accuracy on the neutral position of the legs in reference to the pelvis, that is, the legs must be in neither adduction nor abduction. In the cases where one hip is ankylosed in deformity, it is difficult and often impossible to make a measurement with any degree of accuracy.

Frequently, in litigation procedures, a graphic and more impersonal record of length discrepancy, such as is being advocated in this paper, is desirable. The x-ray can be falsified, but if it is taken and demonstrated properly, it makes a better impression than the reporting of a simple tape line measurement.

In casting about for a way to record length discrepancies in a practical manner, the idea of using the x-ray came to me some time ago and there has been very little change in the actual technic from the start. I have been using this method now for seven or eight years and as time goes on am more enthusiastic about it.

In brief, I measure the leg length discrepancy by recording the vertical distance on an x-ray film between horizontal lines drawn tangent to the proximal ends of the femoral heads taken with the patient placed on the x-ray table so that both feet are down against a shelf extending across the foot of the table (*Fig. 1*).

Although it is not necessary, I use a thick glass shelf so that I can see from the ischemia of the sole of the foot that a definite amount of pressure is being exerted, comparable to actual weight-bearing with the patient in the standing position. The patient pulls himself down firmly against the shelf either by grasping the sides of the table, or better, using "cargo hooks" with their points inserted into the slots usually present at intervals on the metal strip on the sides of the x-ray table surface put there for attaching the transverse compression band or the foot piece (*Fig. 2*).

Fig. 1
Modified cross shelf with ischemic plantar surface showing through glass section.

*Read in Section on Bone and Joint Surgery, Southern Medical Association, Thirty-Third Annual Meeting, Memphis, Tennessee, November 21-24, 1939.

Originally, I obtained my horizontal tangents for the femoral heads by drawing them on a film that was taken with the inactive Bucky grid recorded on the film as vertical parallel lines. By using an ordinary forty-five-degree celluloid triangle with a line scratched in it parallel to the base, I am able to draw these tangents to the femoral heads with sufficient accuracy for practical purposes (*Fig. 3*). In the last few months, instead of using the inactive Bucky, I now use a cassette in which vertical and horizontal wires are embedded. The vertical distances that the proximal ends of the spherical femoral heads are from this transverse line, recorded on the film by the cross wire in the cassette, indicates the discrepancy in leg length and constitutes a permanent record. This measurement is admittedly not absolutely accurate and the distance recorded on the film between the horizontal tangents is really more than the difference in horizontal distances between the actual femoral heads. This factor is relatively negligible and, in addition, it is a factor which is present in all of the x-rays. The distance from the cassette to the top of the table averages two inches, and the distance between the top of the table and the proximal end of the femoral head is about two-thirds of the thickness of the body, which is always measured with the device that is usually provided with the x-ray equipment. As this factor obtains throughout a given case, it practically eliminates itself. I have made x-rays experimentally with the tube six inches proximal to the head and six inches distal to the femoral head without influencing to any extent the recorded distance between the horizontal lines. A variation of the location of the tubes on either side of the midline of the x-ray table does not increase the error and if a Bucky is used, one ordinarily takes great pains to be sure that the tube is directly over the middle of the table.

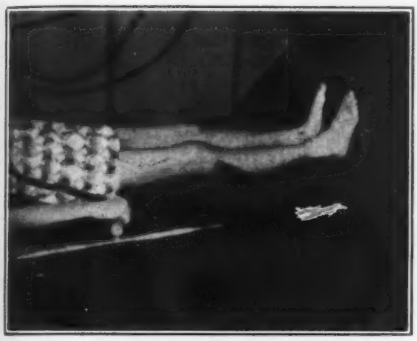


Fig. 2
Lateral view showing patient pulling herself down against shelf with "cargo hooks."

Fig. 3
Method of using celluloid drafting triangle to draw tangents to femoral heads.

The factor of greatest error in these measurements lies in the height of the proximal portion of the femoral head from the film, and, as I say, this error in growth studies continues throughout a given case and practically cancels itself. Roughly speaking, the distance between the top of the x-ray table and the proximal end of the average femoral head in an adult is three inches. To this is added the two inches between the top of the table and the cassette, making five inches in all. By resorting to plane geometry, it is immediately seen that in such an instance where the distance is five inches and the ordinary tube-cassette distance is thirty inches, that a 20 per cent magnification of the distance between the horizontal lines can be figured on.

Another possibility of error is the uncertainty that both feet are firmly pressed against the bottom transverse shelf. Sometimes, of course, this cannot be done and blocks of known thickness must be interposed (*Fig. 4*), particularly in those cases where the discrepancy is due to an adduction deformity in an ankylosed hip. I have thought several times of using plate glass blocks, but just have not felt that that was necessary.

As actual discrepancy in leg length varies in its importance with the height of the individual, it is well to record somewhere on the plate the

Fig. 4
Wood block of known thickness employed beneath plantar surface when the leg is too short to reach the shelf.

height of the patient. Simple geometry shows us that a discrepancy of two inches in a child three feet tall is equivalent to four inches in a six-foot adult. This height can be recorded with lead figures on the film in the usual way.

All in all, I have found this method to be entirely satisfactory and, as I say, am using it as a routine in all of my leg length studies.

DISCUSSION (*Abstract*)

Dr. John D. Sherrill, Birmingham, Ala.—I will do my best to use this method. I am one of many who have been satisfied with the use of the tape measure.

Dr. Earl D. McBride, Oklahoma City, Okla.—I suggest a 36-inch by 14-inch x-ray plate in orthopedic work and in orthopedic hospitals. This plate is used in a 14x36 cassette like any other film. It is not so difficult to develop as you might think, because it folds in three parts and goes into the ordinary tank for development. It shows the pelvis, spine, both legs and both feet, so that there is no chance of error, as I see, in observing tilting of the pelvis, bowing of the spine, or determining leg length. You have it all on the one plate.

The plate is also useful in many other instances, as in scoliosis, sacro iliac and back conditions. It is a little expensive. At the present time, it is not being sold commercially, except on request. The exposure is made at a distance of about 50 inches. The Bucky diaphragm and the table are upright so that the patient stands on the floor in a natural position as the picture is made.

In measuring leg length, it can be turned down so that the patient can lie on the floor and it can be compared with a similar picture made standing. If we have those facilities, we can use it enough, I think, to pay for the added expense to any x ray equipment.

Dr. J. Albert Key, St. Louis, Mo.—I should like to ask Dr. Kite how much more accurate that is than the tape measure. It looks to me like hitting a fly with a sledge hammer. Besides, how does he check up to be sure he records on the films the number of blocks used?

Dr. F. Walter Carruthers, Little Rock, Ark.—Not being the mechanical genius we know Dr. White to be and having just listened carefully to the essayist's remarks, it appears to me, off hand, that his method is very complicated and subject to as many errors or more, no doubt, than the simple tape measure.

Those ingenious cotton bale hooks, I would recommend, and suggest their use to the obstetricians, as they no doubt would be very helpful to a woman in labor.

Dr. J. Hiram Kite, Atlanta, Ga.—This method of measuring the length of legs is both practical and accurate. It is very simple when the x-ray department has adopted the routine.

Dr. White introduced the square chisel several years ago to simplify fusing the epiphyseal lines. I should like to show a slide of the x-rays of a 13-year-old child showing the epiphyseal lines open before the operation and another ten months later, showing the epiphyseal lines well fused both above and below the knee, including the head of the fibula.

The second series of three slides shows the x-rays of the knees of a girl with tuberculosis of the hip, on whom I did a hip fusion several years ago. She has an excellent result in the hip, but has a short leg. Before doing an epiphyseal fusion on the long leg at the age of 13½ years, I made an x-ray of her knee and found that the epiphyseal lines had already fused. I am reasonably sure of her age, as I have had her under treatment since she was 6 years old. The x-ray at 12 shows the epiphyseal lines open, at 12½ very narrow, and at 13½ completely fused. From my experience with this case, it is my routine to x-ray all knees in older children before doing the fusion, to make sure that the epiphyseal lines have not already fused.

Dr. White's method is accurate for any case where the hips are freely movable, but ankylosed hips offer a somewhat different problem. Epiphyseal arrests are useful in cases of unequal leg length following tuberculous infection and other infections in hips, but here the patient cannot twist the pelvis and the difference in length has to be more carefully equalized by placing the proper thickness of blocks under the foot of the short leg, and taking care to use this same thickness of blocks for all subsequent measurements. In studying patients who have only a fibrous ankylosis of the hips, the measurements have varied when the amount of abduction or adduction has increased from one x-ray to the other.

For the children whose hips are freely movable, and who have no deformities about the hips, this method checks very closely with the measurements obtained by a tape line. It is more accurate, and is a graphic method which eliminates more of the human equation, and will give us more dependable information for the study of epiphyseal growth.

Answering Dr. Key's question, I think if you should kill a fly with a sledge hammer, you would be rather successful. If this introduces a little more accuracy into our method of measuring legs, it will be a little more convincing to the other members later on as to how much the legs do shorten as time goes on, how much shortening takes place at the various epiphyses. It checks with surprising accuracy with our patients.

Every patient of my own is measured with a tape

measure and the measurements are recorded at six-month periods. We check that with our x-ray measurements and they are very accurate. Anyone who is accustomed to using a tape measure can measure these legs with very little error. If you want to introduce greater accuracy into your work, this method of Dr. White's will do it.

Answering Dr. McBride, more men will use these long films if the city hospitals and general hospitals can be persuaded to buy them. This is a hard job of persuasion, and in the meantime we can be using this method, which seems to be very accurate.

I have been frightened sometimes at the amount of leg length these children have lost. We should not do the operation at too early an age, or the normal leg might become shorter than the affected leg. It is always desirable that the normal leg be slightly longer. Dr. White and others who have done this work figure that the child will lose from a quarter of an inch to three eighths of an inch a year, that is, if he does the epiphysis above the knee. About 40 per cent of the growth of the leg occurs in the epiphysis above the knees. Since we have been doing this work we have all gotten more interested in the study of epiphyses. We have overlooked a great deal in times past. An illness that the child has had will leave a transverse line on the bone, forever in the bone marking the point. If the child is x-rayed several years later, the line will be higher above the epiphyseal line on the femur, at the lower end of the femur, than it is on the tibia. Probably 40 per cent of the growth takes place above the knee and about 20 per cent takes place in the epiphyseal line just below the knee. So if the child has, say, 3 inches of shortening at the age of 12 and he is going to grow for six years yet, until he is 18, if he loses a quarter of an inch a year, you are going to end with an inch to an inch and a quarter shortening instead of three or four inches of shortening. It is a very simple operation. I do not need to go back over it. With our technic, the child spends two weeks in a cast, four weeks in bed. The bone has not been cut in two. There is no stiffness about the knees and it has worked out very satisfactorily. This x-ray measurement is simple and accurate for determining how much he has grown.

USE OF INGALS GOLD TUBE IN FRONTAL SINUS OPERATIONS*

By D. H. ANTHONY, M.D., F.A.C.S.
Memphis, Tennessee

Fernelius,[4] of France, in 1497, was the first to describe symptoms of suppuration of the frontal sinuses. In 1507, Beniveni,[2] of Italy, also published symptoms of frontal sinus infection. Littre,[12] of France, in 1704, was the first to conceive the idea of external trephining of the frontal sinuses. In 1884, Ogston,[17] of England, was the first to perform an external operation on the frontal sinus. Jurasz,[9] in 1887, was the first to introduce a sound into the frontal sinus through the nasal opening. In 1890, Schaeffer,[19] of Germany, had proposed to drain the frontal sinus by enlarging its communication with the middle meatus through the infundibulum.

After making a very careful study of almost all of the frontal sinus literature that I have been able to obtain, I have reached the conclusion that frontal sinus operations have been performed less frequently within the last ten years, especially the last five years, than within the ten previous years. The reason for this, I believe, is that more people are being examined for allergy and nasal symptoms, and as a result of examinations and treatments almost all of the sinuses are less involved. Another reason for the prevention of many frontal sinus operations is the frequent use of ephedrine sprays during acute upper respiratory infections. X-ray diagnosis has encouraged early and more frequent irrigations of the antra, and within the last five years more irrigations of the frontal sinuses have been done following the subacute infectious stage. Within the last two years, the world-wide use of sulfanilamide has greatly helped to relieve violent, acute upper respiratory infections.

With the exception of trephining of the frontal sinus for very acute fulminating cases that do not respond to the above treatment, all intranasal and external frontal sinus operations call for making a new nasofrontal duct. I have found that all of the writers agree, without exception, to one of two things, namely: that the frontal sinus has to be obliterated or a patent, new, nasofrontal duct has to exist in order to improve or cure chronic frontal sinus infections which often require one or more frontal sinus operations. Practically all of the writers on this subject, both in this country and abroad, advise trying first a type of frontal sinus operation which will not leave the patient with much deformity. The majority of frontal sinus operations, that do not result in marked deformity, usually do not obliterate the frontal sinus cavity except when the frontal is small; therefore, the nasofrontal duct should be freely patent so that when recurrent acute infection occurs in the nose affecting the old operated frontal sinus, this region can be treated more directly, and in this way secondary frontal sinus operations can frequently be prevented.

In my recent review of frontal sinus literature,

---

*Read in General Clinical Session, Southern Medical Association, Thirty-Third Annual Meeting, Memphis, Tennessee, November 21-24, 1939.

†The author thanks V. Mueller & Company of Chicago for furnishing the Ingals gold tubes and for the illustration of the tubes.

I was impressed with the fact that the majority of writers state that the failures of intranasal and external frontal sinus operations were due to improper, permanent nasofrontal drainage and failure to remove all of the diseased frontal sinus membrane. It is necessary to operate more frequently on the large frontal sinus, and this is the type in which it is very difficult to remove all of the diseased membrane. However, with the aid of a very small laryngeal mirror, most of the diseased mucous membrane can be removed, using either the Jansen or Lynch operation. There are three reasons why I suggest the Jansen or Lynch method, namely: first, the patient as a rule will give an early consent to this type of operation; second, the patient will be better satisfied with the cosmetic result; and third, it is very important in operations on large frontal sinuses, and this is usually the type that has to have an operation, that the proper tube be used in such a way as to produce a large, permanent new nasofrontal duct that epithelizes itself before granulation tissue obstructs the lumen of this new formed nasofrontal duct. This can often be done when the Jansen or Lynch method is employed, and it is very important that some kind of tube be used that can remain in this new formed nasofrontal duct for many months or years to insure a permanent, patent, new nasofrontal duct.

Following is a review of the methods of a few recent writers in treatment of the new nasofrontal duct at the time of intranasal or external frontal sinus operation.

Lynch,[14] in 1921, said: "A large drainage tube three-eighths of an inch in diameter, with one end cut on a long bevel, is passed through the vestibule of the nose and lies in what was the area of the beginning infundibulum of the frontal sinus. The rubber tube is left in place for five days, as a rule, then it is removed. After the removal of the rubber tube, a large dilator or sound is passed into the sinus and this is kept up, usually for ten days, until the healing seems to be established and convalescence about complete."

C. M. Anderson,[1] in 1924, reported the results in sixteen frontal sinus operations, twelve of which had been operated upon elsewhere. He says that thirteen of the above sixteen cases of frontal sinus operations were very successful. One of the three remaining cases was a typical neuralgia case which was relieved by injections of alcohol in the second division of the fifth nerve. The second case had a recurrence of frontal sinus symptoms after having been apparently cured for several weeks. A modified Killian operation was performed, and it was found that the nasofrontal duct was obstructed by polypi which had filled the frontal sinus. The third case complained of severe pain on exposure to cold air; this case was operated upon again and a beginning mucocele was found. Anderson says: "In all external frontal operations, if the frontal sinuses have not been entirely obliterated, the chief difficulty is a tendency of the new nasofrontal duct to close. This can be avoided to a great extent by the use of dilators."

Laval,[10] in 1925, first suggested the mucous membrane transplants from the lower lip. William Mithoefer,[15] in 1927, also said that he had used lip mucous membrane in conjunction with the nasal mucous membrane flaps, and he believed that if this were done, there would be less likelihood of closure of the nasofrontal opening after external frontal sinus operations. He further said: "It would be futile to deny the fact that many times the results of the external operations on frontal sinus are not ideal, and that after a short space of time, sometimes only six weeks, retention of secretion may occur as a result of constriction of the nasofrontal opening."

F. R. Spencer,[24] in 1929, used a cigarette, gauze wick, or a rubber tube drain. This was removed at the end of twenty-four to forty-eight hours following the conservative modifications of the Lothrop external frontal sinus operation.

M. M. Cullom,[3] in 1929, said that he used two rubber tubes in the new formed nasofrontal duct. The outer tube is one-half of an inch; the second smaller tube is inserted in the outer tube. He removes the smaller tube at the end of the twenty-fourth hour. The larger tube is removed at the end of the eighth or tenth day.

H. B. Goodspeed,[6] in 1930, used a number twenty-six French catheter in the new nasofrontal duct. He removed this tube at the end of the seventh or eighth day following the Lothrop-Killian radical frontal sinus operation.

Simpson and Sanders,[21] in 1931, advocated using a rubber tube in the new formed nasofrontal duct following operation, and this tube was left in the duct for a few days. However, Simpson, in 1939, states that he does not use a tube now, but uses small iodoform gauze packed loosely in the frontal sinus and nasofrontal duct which he gradually removes after three or four days.

Ferris Smith,[23] in 1934, advocated a five-eighths inch rubber tube covered with Thiersch's skin graft. Arbuckle, in 1938, said that he lined the new nasofrontal duct with a Thiersch graft, but he later had to reoperate upon every case to remove the skin, as it had produced an objectionable secretion which had obstructed the nasofrontal duct. He further said that he now operated in such a way as to obliterate the frontal sinus so that there would be no need of a frontal sinus duct. He believes that the Lynch modified operation gives him the best results.

E. C. Sewall,[20] in 1934, advocated the use of a flap of nasal mucosa turned upward to line the frontonasal opening and the sinus.

Howarth,[7] of London, in 1936, said: "The whole success of the operation depends on the patency of the new frontonasal duct being maintained." He advises the use of a flat skin graft in the nasofrontal duct.

Parrish,[18] in 1937, said: "From my experience there are two reasons for these failures in frontal sinus operations: first, incomplete removal of the diseased tissue from the frontal sinus; and second, inadequate drainage into the nose. Inadequate drainage into the nose may result from several things: first, failure to remove

intranasal obstruction prior to operation; second, insufficient enlargement of the nasofrontal duct at the time of the operation; third, healing and contraction of the scar tissue in the nasofrontal opening; and fourth, collapse of the soft tissues from the orbital region into the bony opening; the collapse due to the extension of the bony opening too far down on the nasal wall."

R. H. Good,[5] in 1935, reported three hundred intranasal frontal sinus operations in which he used the frontal sinus rasps, which are smooth on the posterior surface and on the nasal side, making it necessary to have a right and left rasp. He used no tube following the operations, as he had found the tube to be a discomfort to the patient.

H. I. Lillie[11] uses a large rubber tube in the nasofrontal duct which he leaves in the duct for a considerable length of time to insure patency in the nasofrontal sinus duct. In December, 1938, Lillie said: "I have found that it is most difficult to keep the nasofrontal duct open in a satisfactory manner in many cases. Why some occlude and others do not, I am unable to explain satisfactorily to myself."

In December, 1938, F. E. LeJeune said: "I have found the Lynch method very satisfactory and I would say that the only trouble which I have had has been in premature closing of the opening in some cases. This has occurred in spite of the fact that the entire floor of the frontal sinus had been removed at the time of the operative procedure."

A. T. Smith, in 1939, advocated a rubber tube and he left this tube in the duct from seven to ten days.

In 1939, Barnhill said that he used the external Killian or the modified Lothrop operation. He further states that there are two points which must be attained: first, a large, permanent nasofrontal duct; and second, the removal of all of the diseased mucous membrane. He does not say that he uses a tube following the operation.

Ralph Fenton, in 1939, said that he used the Lynch type operation and the Sewall nasal mucous membrane flap in the new formed duct.

In 1939, E. G. Gill said that he used a rubber tube in the nasofrontal duct which he allowed to remain in the duct from two to seven days.

In 1939, Paul Moore wrote: "It has been my practice to use rubber tubes in the nasofrontal duct on my external frontal operative cases. I try to use as large a tube as the duct will admit and to use a tube that is fairly flexible, but has rather strong walls. I like to leave the tube in place for at least two weeks, and sometimes as long as sixteen to eighteen days."

Mellinger, in 1939, reported that he used the technic of Sewall[20] or Ferris Smith.

Harris P. Mosher,[16] in 1937, said in his paper, "Unsolved Problems in Otolaryngology:" "The radical frontal sinus operation is still unsatisfactory. Ten per cent of our cases, that is, those done at the Massachusetts Eye and Ear Infirmary, have to be reoperated. The betterment of the operation lies in the perfection of some technic for epidermatizing the enlarged nasofrontal duct or obliterating the sinus. The latter is simple in theory, but very uncertain as now practiced."

E. F. Ingals,[8] of Chicago, published an article in the *Annals of Otology, Rhinology and Laryngology,* in September, 1905, entitled "New Operation and Instruments for Draining the Frontal Sinus." He described an intranasal frontal sinus operation by which he opened the frontal sinus through the nasofrontal duct region with an electrically driven burr guided by a probe. After making a large intranasal opening in the frontal sinus, he inserted a self-retaining Ingals gold tube. Ingals' description of the gold tube is as follows: "The self-retaining gold tube (*Fig. 1*) is three and one-half centimeters long and six millimeters in diameter. It is made of spring gold. The lower end has an oval cup-like flange nine millimeters long by six millimeters wide. From the upper end, the tube is sawed down two centimeters in six places, making six sections, nearly a millimeter of the end of each of which is bent inward at a right angle so as to make the end blunt. About twelve millimeters below this upper end I bend out each of these sections so as to make the upper end funnel-shaped and about nine millimeters across at the end, which makes the tube self-retaining. The slits down the side make each of these sections a nearly flat spring about two millimeters wide and two centimeters long and render it easy to withdraw the tube at any time the surgeon may wish. The slits also prevent pocketing of pus about the tube in the lower part of the sinus. The part of a gelatine capsule used to hold these six spring sections together when introducing the tube is a trifle smaller than the outside of the gold drainage tube." Ingals advocated leaving the gold tube in the nasofrontal duct for about four months; however, he thought it could remain as long as deemed necessary. Ingals treated fifty chronic frontal sinus operative cases with this method and reported 95 per cent of these cases cured.

The only other case report that I have been able to find in which an Ingals tube was used is the case reported by Dr. Ellett, in 1905, a few months after Ingals published his paper introducing the use of the gold tube in frontal sinus operations. Dr. Ellett's case was a white woman, aged 45, with a very broad and high frontal sinus cavity, and the transillumination extended almost to the hairline of the forehead. He operated upon the left frontal, intranasally, and inserted a gold tube advocated by Ingals in the new formed nasofrontal duct. He inserted this tube intranasally and let it remain in the duct for seven months, after which it was removed. The patient had no more trouble with the left frontal sinus.

In 1939, I saw this same patient, and found the left frontal region clear. I could pass a probe through the left frontal duct without any difficulty. The new nasofrontal duct that Dr. Ellett had made and in which he used the Ingals

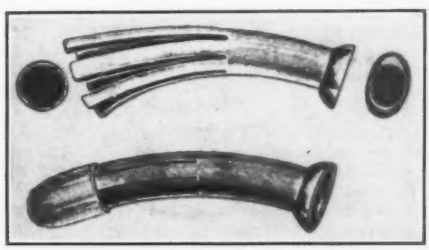


Fig. 1
Ingals gold frontal sinus tube.

gold tube looked to be about one-eighth of an inch in diameter.

Within the last fourteen years I have performed nine external frontal sinus operations and one intranasal frontal sinus operation upon patients with chronic frontal sinusitis, using the Ingals gold tube in the new formed nasofrontal duct. In each case I removed the anterior one-third of the middle turbinate, anterior ethmoid cells, removed about ¼ to ½ inch of the floor of the frontal sinus, and inserted the Ingals gold tube in the frontal sinus through the nasal cavity. I removed almost all of the mucous membrane from the frontal sinus in the nine external operations, but in the intranasal operation I removed only enough of the mucous membrane to make a good free opening into the frontal where the nasofrontal duct was.

CASE REPORTS

Case 1.—April 9, 1925, I first saw Mrs. M. H. B., a white woman, aged 72, who gave a history of having had a profuse discharge from both sides of her nose for fifty-one years. Examination showed a marked mucopurulent discharge from both sides of the nose which seemed to be coming from the middle meatus. There had been marked swelling in the region of the floor of the left frontal for about two weeks. An x-ray of the frontal sinuses showed extensive erosion of the floor of the left frontal. April 13, 1925, I performed a left external frontal sinus operation and found the frontal filled with mucopurulent secretion; about one-third of the nasal side of the frontal floor had been destroyed by the infection. I removed the anterior one-third of the middle turbinate and anterior ethmoid cells and placed an Ingals tube in the new formed left frontal sinus duct. I left this tube in place for four months and the patient had no more trouble with the left frontal sinus. However, this patient did continue to have bloody scabs on both sides of her nose due to chronic ulcers of the septum with apparently some secretion from her other sinuses. For the first twelve months following the removal of the Ingals gold tube from the frontal sinus, I could pass a probe into the frontal sinus very easily, but after about one year I was unable to pass a frontal sinus probe through the nasofrontal duct. I observed this patient off and on until the time of her death from pneumonia twelve years after the operation.

Case 2.—January 1, 1927, I saw Mrs. J. B. C., a white woman, aged 64, who gave a history of having pain in the left frontal region with a severe headache for two or three days. She said that the region above her left eye had been sore to touch for three days and that her physician in Portland, Oregon, had operated externally on the left frontal sinus about six months before. Externally, the left frontal sinus region looked as if the patient had had an external Killian's frontal sinus operation. The nasofrontal duct was closed. On January 13, 1927, I found it necessary to perform a left, secondary external frontal sinus operation. I made a new nasofrontal duct and almost all of the frontal sinus mucous membrane was removed. I inserted a large rubber tube which remained in the nasofrontal duct for ten days.

In 1929, while visiting in Santa Barbara, California, this patient had an acute cold with recurrent infection in the left frontal sinus. Her physician in Santa Barbara, California, performed the third operation on the left frontal. He made an external incision and inserted a rubber tube in the new formed frontal duct which I removed seven weeks later. Three months after the third operation, the patient had an acute upper respiratory infection with infection in the left frontal sinus; the left frontal duct was found closed. This time the left frontal sinus contained a small amount of pus. I inserted an Ingals gold tube in the new formed left nasofrontal duct through an external incision. Ten months later I removed the tube, as the patient's condition was good. After this fourth operation, in which the Ingals tube was inserted in the nasofrontal duct for the first time, the patient had no further trouble with the left frontal sinus for eight years.

January 19, 1938, the patient came to see me complaining of soreness and swelling of the left frontal anterior wall region for two days. About one-half inch from the supra-orbital ridge, in the region of the anterior left frontal wall, there was a soft and fluctuating swollen region about one inch in diameter. An x-ray picture showed marked erosion of the left frontal anterior wall, and I made a diagnosis of an erosion of the anterior frontal wall due to a mucocele in the left frontal sinus. The nose was clean, but I could not pass a probe through the nasofrontal duct which I had made eight years before.

On March 7, 1938, it was necessary to perform a fifth external frontal sinus operation in this same left frontal. This time the cavity was completely filled with thick, straw-colored, purulent secretion. I could not pass a probe to the nose, but there seemed to be only a membrane occluding this passage, so I made a new opening in the left region of the old nasofrontal duct and inserted an Ingals tube. The tube is still in the nasofrontal duct and the patient has had apparently no trouble with the left frontal sinus since. Six months after this operation, she had an acute upper respiratory infection associated with influenza, at which time she noticed a marked soreness in the left frontal region. On examination I found that there was a small amount of purulent secretion discharging through the Ingals tube, and the tube was open. Ten days after the recovery of the patient from influenza, there was no discharge from the left frontal and she has had no trouble with the left frontal sinus since. This patient has informed me on several occasions that she would never allow anyone to remove the Ingals tube that she now has in her left nasofrontal duct, and I think that this patient's decision is correct. There is a slight external deformity caused by the first operation (Killian's).

Case 3.—January 19, 1931, I saw Mrs. C. E. L., a white woman, aged 44, who gave a history of having continual discharge from both sides of her nose for three years, worse from the left side. She had had headaches in the left frontal region off and on for three years, especially when she had a cold. On examination, I found a profuse, purulent secretion in the left middle meatus. X-ray pictures of the sinuses showed all sinuses to be very cloudy with the exception of the sphenoids. The frontal sinuses were small in size. The patient continued to complain of pain in the left frontal region and her temperature was 102° F.

On January 23, 1931, I did a trephining of the left frontal. I found a marked amount of purulent secretion; the mucous membrane was very thick and showed chronic infection with acute exacerbation. I made an external incision and removed only enough of the floor of the frontal sinus to insert a rubber tube through the external incision. On February 14, 1931, I removed the rubber tube, performed a left external frontal sinus operation, and inserted Ingals tube in the new formed nasofrontal duct. The patient recovered rapidly after the operation. Four months later there was no discharge and the patient seemed to have completely recovered, so I removed the tube from the left frontal. The patient has had no further trouble with the left frontal. I saw the patient February 2, 1939, and there was no external deformity of this region. I was unable to pass a probe into the frontal sinus, as the nasofrontal duct was closed.

Case 4.—June 18, 1934, Miss A. C., a white girl, aged 19, consulted me, giving a history of having been unable to breathe well through both sides of her nose for six months following an upper respiratory infection, and having pain above the left eye for two months associated with a thin mucopurulent discharge from the nose. Dr. T. C. Chapman had removed several polypi from both sides of her nose during the preceding two months. On examination, I found the left frontal region very tender and the mucous membrane of both sides of her nose very pale with mucopurulent secretion discharging from under the left middle turbinate. X-ray showed all sinuses very cloudy.

Twelve days after my first examination of this patient, I performed an external frontal sinus operation and inserted Ingals tube in the new formed nasofrontal duct. I removed almost all of the mucous membrane.

In October, 1934, a complete test for allergy was made by Dr. J. P. Henry. She was found sensitive to dust, corn meal, flour, orris root and feathers. This patient was given a diet list and advised to avoid the things to which she was sensitive. However, we were unable to get her full cooperation for the allergic treatment. October 17, 1934, she still had a thin, watery discharge from both sides of her nose, but the tube was open and the frontal sinus was draining through the tube. I could pass a probe into the frontal sinus region through the tube in the nasofrontal duct. The mucous membrane of the nose was still very pale. Dr. Chapman, whom she has consulted from time to time in reference to polypi in her nose, informs me that the frontal sinus is in good condition and the tube, which is still in the nasofrontal duct, is not causing any irritation of the nose.

I saw this patient the last time June 24, 1939, at which time I found the mucous membrane of her nose still very pale on both sides. She had three small polypi growing to the mucous membrane outside the left frontal. These polypi were lying against the Ingals tube. The tube was found open and clean. I could pass a probe through the tube into the left frontal sinus. X-ray pictures taken at this time showed both of the frontal sinuses to be normal. The left antrum was three plus cloudy and the right antrum was two plus cloudy. The patient stated that she had had no trouble with the left frontal since the operation five years ago.

Case 5.—February 7, 1934, Mr. G. S. B., aged 42, a white man, consulted me with a history of having had a chronic discharge from the right side of his nose practically all of his life, and the right eye very red and swollen for six days. On examination, I found the right eye dislocated, downwardly and outwardly, as a result of the swelling in the upper nasal region of the right orbit.

The next day I performed a trephining of the right frontal sinus and found it contained a marked amount of mucopurulent secretion. One month later I did an external right frontal sinus operation and inserted Ingals tube in the nasofrontal duct. I removed this tube June 20, 1934. I saw this patient the last time March 6, 1939, and he gave a history of having had no trouble except a slight double vision at times for one year following the operation. His nose was clean and there was no external deformity. However, I was unable to pass a probe into the frontal sinus region through the nasal passage. March 6, 1939, I made an x-ray picture of his sinuses and found the right frontal to be in good condition.

Case 6.—R. R., a white man, aged 50, thin and suffering with chronic heart disease, consulted me first September 10, 1927, at which time he was convalescing from a left radical antrum operation performed by Dr. Lynch. The antrum healed without any further trouble. January 11, 1934, the patient returned to me complaining of an acute upper respiratory infection with pain in the right frontal region for one week and bloody mucopurulent discharge from both sides of his nose. His temperature was 101° F. Examination showed that the mucopurulent discharge was coming from the middle meatus on both sides of his nose. I advised a trephining of the right frontal sinus, but the patient refused operation. Local office treatments and suction were given the patient off and on until July 1, 1934, with apparently no relief. X-ray pictures showed the right frontal sinus to be very cloudy.

July 18, 1934, I did an external right frontal sinus operation and inserted Ingals tube. I removed almost all of the mucous membrane and one-half of the floor of the frontal sinus. The sinus was filled with mucopurulent secretion and there seemed to be a low-grade osteomyelitis in the center of the anterior frontal wall. Four weeks after the operation the patient still had a soreness of the anterior wall of the right frontal and thick discharge. I irrigated the right frontal sinus through the Ingals tube and removed thick secretion.

As the discharge continued and was profuse, I thought that the Ingals tube could be acting as a foreign body and removed it seven weeks after insertion. The discharge continued, however, and September 15, 1934, I reopened the right frontal sinus and found that a new lining had formed which looked to be healthy, and the anterior wall of the sinus apparently had healed. There was a small perforation in the septum between the frontals; I removed the entire septum between the frontals. The mucous membrane of the frontal sinus was in good condition with the exception of a slight congestion, so I made no other operative procedures other than to clean out the frontal duct and to reinsert the Ingals tube for the second time.

As the discharge continued, two months later, still thinking that the tube might be acting as a foreign body, I removed the tube again. Two months later the discharge still continued through the nasofrontal duct. I did not advise another operation because the patient was in poor physical condition otherwise. I saw the patient off and on until he died from a heart attack

in August, 1936, with the frontal sinus still discharging pus through the new formed nasal duct.

Case 7.—Mrs. E. S. W., aged 69, a white woman, first consulted me September 26, 1936, complaining of recurrent colds for fifteen years and recurrent headaches for three months over the right frontal region. An x-ray showed the right frontal sinus to be very cloudy with erosion of the floor of this region. All of the other sinuses except the sphenoids were cloudy. There was a mucopurulent discharge from the right middle meatus.

Two days later, I performed an external right frontal sinus operation and found a necrosis of the entire floor of the frontal. This sinus was filled with mucopurulent secretion. There was a large erosion of the posterior wall of the frontal, and I did not have to remove any of the floor of the frontal, as it had already eroded. I did remove almost all of the mucous membrane except on the posterior wall, and inserted an Ingals tube.

Two months later I removed the tube and the patient has had no trouble since. The last time I saw this patient was March 24, 1939. She gave a history of having had no trouble with the right frontal sinus. The nasofrontal duct was open and I could pass a large probe through the nose into the frontal sinus.

Case 8.—Mrs. R. G. C., a white woman, aged 57, was referred to me by Dr. R. O. Rychener March 22, 1937. She was complaining of a swelling over the region of the right eye, upper lid, nasal corner, for six or eight weeks associated with soreness and pain in this region. She had no history of a cold or discharge from her nose. Examination showed that she had a swelling of the upper nasal region of the right orbit, and there appeared to be a soft growth in the orbit. The transillumination of her sinuses was clear; no x-ray was made.

I made a diagnosis of soft tumor of the orbit and Dr. Rychener, thinking my diagnosis to be correct, March 23, 1937, started to operate upon this patient to remove the supposed soft tumor. However, while the capsule was being removed, it ruptured and we found a large mucocele in the right frontal sinus which had caused an erosion of practically the entire floor of the frontal. I finished the operation, as it turned out to be a frontal sinus case, and inserted an Ingals tube in the new formed nasofrontal duct. This patient has had no trouble since the operation and there is no deformity of this region. I saw her March 25, 1939. There was no discharge present, the tube was clean, and I could pass a probe through the tube into the frontal sinus.

Case 9.—M. E. P., aged 37, a white man, consulted me first December 20, 1937. He gave a history of having a continual discharge from both sides of his nose for several years, worse during the winter season. He had many scabs in his nose and had been irrigating his nose once a day with salt solution for six months. This patient had recurrent, acute upper respiratory infections and with each acute attack he had swelling and tenderness in the right frontal region. Local office treatments of shrinking the mucous membrane of his nose and using suction seemed to give him relief.

July 4, 1938, he developed an acute exacerbation of the right frontal associated with marked discharge and tenderness in the region of the right frontal. July 16, 1938, I performed an external right frontal sinus operation and inserted Ingals tube.

This man had no trouble until about one month after the operation, at which time the tube became clogged with dried secretion, causing soreness in the right frontal. I cleaned out the tube and the soreness disappeared within a week. I have kept this man under observation since, and the last time I saw him was November 15, 1939, at which time the tube was open and clean and the frontal sinus in good condition.

Case 10.—Mrs. M. J. F., a white woman, aged 69, who first consulted me August 30, 1939, gave a history of having a great many scabs form in the right side of her nose for three years, recurrent head colds during the winter season for two years, and for the last four weeks prior to my first examination she had had a marked swelling in the region of the floor of the right frontal which gave her a slight exophthalmos on the right side. There was marked swelling behind the upper lid which slightly displaced the right eye, downwardly and outwardly. Examination revealed that the right side of her nose contained a marked amount of dried secretion and scabs. The right middle meatus was filled with three large polypi. X-ray pictures of the sinuses showed the right frontal three plus cloudy and the left frontal clear; the right antrum four plus cloudy and the left antrum clear. I advised an intranasal frontal sinus operation at once.

On September 18, 1939, I removed the anterior two-thirds of the right middle turbinate, three polypi from the middle meatus, the anterior posterior ethmoid cells, enlarged the nasofrontal duct intranasally, and inserted Ingals tube into the frontal sinus through the nose.

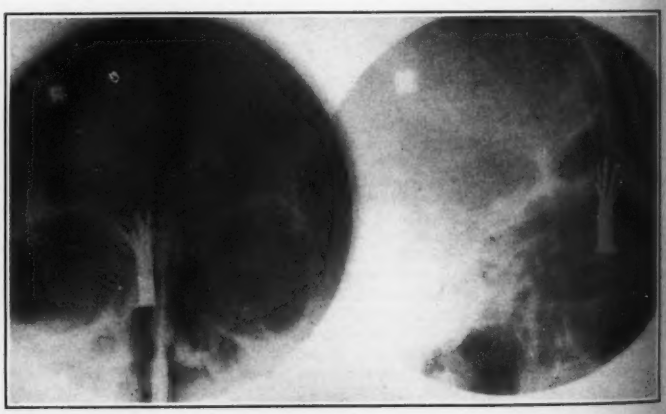


Fig. 2, Case 10

Anterior posterior and lateral view of Ingals gold frontal sinus tube in the new formed nasofrontal duct.

I ma
the n
had
the t
preser
tion,
pain
(*Fig.*
the ri
a slig
now b

Fr
Ingal
sinus
foreig
that i
were
in son
be be
remov
most
think
ary fr
chroni
tranas

1. And
Arch
2. Beni
son:
W.
3. Cull
Arch
4. Ferr
adel
5. Good
Over
(Ma
6. Good
Radi
ence
7. Howa
Ethn
1936.
8. Ingal
the
519
9. Juras
Klin.
10. Laval
lung
Naser
11. Lillie,
Amer.
Posto
tion
(Dec.
12. Littre,
Appel
tions
106.
13. Loeb,
vol. 2
14. Lynch
eration
Jan.,
15. Mithoe
Arch.
16. Moshe
Trans.
17. Ogston
Disease
18. Parrish
Texas
19. Schaeff
Ranku
Sinus
907, 1

I made a large opening into the right antrum through the middle meatus. Since this operation the patient has had a profuse discharge through the tube. However, the tube has shown no signs of obstruction. At the present time, two months and two days since the operation, the discharge is much less. The patient has no pain or soreness in the frontal region. X-ray pictures (*Fig. 2*) taken two months after the operation show the right frontal to be two plus cloudy. There is only a slight swelling behind the upper lid and the eye is now back to its normal position.

From my experience I believe the use of the Ingals tube to be very satisfactory in any frontal sinus operation. It does not seem to act as a foreign body in the sinus, and I am of the opinion that in the majority of cases, if the Ingals tube were left in the frontal sinus for one year or in some cases indefinitely, the end results would be better than if the rubber tube were used and removed within several days or a few weeks, as most of the frontal sinus operators advise. I think the Ingals tube is indicated in all secondary frontal sinus operations and in all very large, chronic, infected, frontal sinus, external or intranasal operative cases.

REFERENCES

1. Anderson, C. M.: External Operation on the Frontal Sinus. Arch. Otolaryng., **15**:739-745 (May) 1932.
2. Beniviene, A.: De Abdotis Causis Morborum, 1507. Garrison: History of Medicine, 4th Edition, p. 232. Philadelphia: W. B. Saunders Co., 1929.
3. Cullom, M. M.: External Operation on the Frontal Sinus. Arch. Otolaryng., **2**:304-317 (March) 1930.
4. Fernelius, A. J.: Wright's History of Nose and Throat. Philadelphia: Lea & Febiger, 1914.
5. Good, R. H.: Frontal Sinusitis: Conclusions Arrived at from Over 300 Intranasal Operations. Laryngoscope, **14**:389-397 (May) 1935.
6. Goodspeed, Harry B.: Present Status of the Lothrop-Skillern Radical Operation on the Frontal Sinus with Special Reference to Technic. Laryngoscope, **40**:832-837 (Nov.) 1930.
7. Howarth, Walter: Some Points in the Technic of the Fronto-Ethmoidal Operation. Jour. Otolaryng., **51**:387-390 (June) 1936.
8. Ingals, E. F.: New Operation and Instruments for Draining the Frontal Sinus. Ann. Otol., Rhinol. & Laryng., **14**:512-519 (Sept.) 1905.
9. Jurasz, A.: Ueber die Sondirung der Stirnbeinhohle. Berl. Klin. Wchnschr., **24**:34-36, 1887.
10. Laval: German Periodical, Beitrag Zur Operativen DeHandlung Der Stirenohleniterung. Printed in Ztschr. F. Hals-Nasen-U-Ohrenh-Munchen U-Berl., **12**:404-413, 1925.
11. Lillie, H. I.: External Operations on the Frontal Sinus. Amer. Jour. Surg., **43**:199-206 (Oct.) 1938.
    Postoperative Complications of the Radical External Operation on the Frontal Sinus. Arch. Otolaryng., **14**:793-796 (Dec.) 1931.
12. Littre, Alexis: 1704, Observations sur une Espece d'enfleure Appellee Emphyseme, pp. 4-14, Paris, 1715, and Observations von Einem Pulsadergeschumlate (Aneurysma), pp. 97-106. Index Catalogue of Library, **9**:608, 1900.
13. Loeb, H. W.: Operative Surgery of the Nose, Throat and Ear, vol. 2, pp. 62-63. St. Louis: C. V. Mosby Company, 1919.
14. Lynch, R. C.: The Technic of a Radical Frontal Sinus Operation which Has Given Me the Best Results. Laryngoscope, Jan., 1921.
15. Mithoefer, William: External Operation on the Frontal Sinus. Arch. Otolaryng., **7**:133-146 (Feb.) 1928.
16. Mosher, Harris P.: Unsolved Problems in Otolaryngology. Trans. Amer. Acad. Otolaryng. & Ophth., **42**:27-47. 1937.
17. Ogston, A.: Trephining the Frontal Sinuses for Catarrhal Diseases. Med. Chron., Manchester, **1**:235-238, 1884-5.
18. Parrish, R. E.: The Present Status of Frontal Sinus Surgery. Texas Jour. Med., **33**:52-55 (May) 1927.
19. Schaeffer, M.: M. Zur Diagnose und Therapie der Erk Rankungen der Nebenhohlen der Nase, mit Ausnahme des Sinus Maxillaris. Deutsche Med. Wehnschr., Leipz, **16**:905-907, 1890. Index Medicus, **12**:584, 1890.
20. Sewall, E. C.: External Fronto-Ethmosphenoid Operation. Arch. Otolaryng., **20**:57-60 (July) 1934.
21. Simpson, W. Likely; and Sanders, Sam H.: Interesting Observations in More than 100 External Ethmo-Frontal Operations. Laryngoscope. **41**:23-28 (Jan.) 1931.
22. Skillern, R. H.: Catarrhal and Suppurative Diseases of the Accessory Sinuses of the Nose, p. 269. Fourth Edition. Philadelphia: J. B. Lippincott Co., 1923.
23. Smith, Ferris: Management of Chronic Sinus Disease. Arch. Otolaryng., **19**:157-171 (Feb.) 1934.
24. Spencer, F. R.: Conservative Modification of the Lothrop External Frontal Sinus Operation. Arch. Otolaryng., **9**:501-508 (May) 1929.

USE OF PONTOCAINE IN SPINAL ANESTHESIA*

A REPORT BASED ON 1,710 CONSECUTIVE CASES

By E. Bryce Robinson, Jr., M.D.†
Fairfield, Alabama

Since the introduction of spinal anesthesia in 1885 by Corning, several periods of enthusiasm have been followed by periods of disuse and condemnation. In the intervening years with the introduction of less toxic drugs, improved methods of administration and control, and proper use, spinal anesthesia has been more and more widely used. At the present time we consider spinal anesthesia to be the safest and quickest anesthetic in its field and there can be no argument that it provides the best relaxation of all anesthetics. This is true only when its administration is in the hands of an experienced physician who has a detailed knowledge of its action, and, most of all, one who thoroughly appreciates its limitations and dangers.

No originality is claimed for this paper which is intended to be only an analysis of the results we have obtained in our clinic with pontocaine spinal anesthesia. Our results have been very satisfactory and gratifying both from the surgeon's and especially from the patient's standpoint. We are strong advocates of spinal anesthesia, but only when it is employed in a proper and intelligent selection of cases with a meticulous technic and an understanding of the fundamentals, agents and methods. Spinal anesthesia is just as safe as the user makes it.

Between July, 1936, and October 15, 1939, we have administered 1,710 consecutive spinal anesthetics using pontocaine. All these anesthetics

*Read in Section on Anesthesia, Southern Medical Association, Thirty-Third Annual Meeting, Memphis, Tennessee, November 21-24, 1939.

*From the Department of Anesthesia, Employees' Hospital, Tennessee Coal, Iron and Railroad Company.

†Chief Anesthetist, Employees' Hospital.

were administered by three physician anesthetists. The pontocaine-glucose method as devised by Sise was used in all of them. The 1,710 spinal anesthetics were administered to 1,658 patients. Twenty-three patients had two anesthetics and two patients had three.

The drug used in this series was pontocaine hydrochloride in 1 per cent solution furnished in ampules of 2 c. c. containing 20 mg. of the drug. It has a specific gravity of 1.0068, approximately the same as the average for spinal fluid. Nowak, from intravenous injections in cats, gives the relative toxicity of pontocaine as 0.58 as compared to 1.0 for novocain. This relative toxicity, of course, refers to the minimum lethal dosage in relation to the therapeutic dose of the drug. We have had no experience with the new pontocaine crystals, as the solution has been satisfactory and we feel makes for a simpler technic.

However, in using the solution one should be assured of a fresh supply, as we have found that it is only fairly stable, and once the pontocaine begins to precipitate out it will not produce spinal anesthesia and some of the failures we have had were due to this fact.

Table 1

Type of Operation	Number	Deaths From All Causes
Gynecological	724	5
Appendectomies	303	1
Hernioplasties	246	1
Genito-urinary surgery	105	7
Gastric	24	3
Gallbladder surgery	28	1
Lower extremities	68	2
Hydroceles and varicoceles	28	0
Abdominal drainage	54	3
Rectal	44	0
Exploratory laparotomies	28	4
Intestinal operations	31	5
Intestinal obstructions	8	4
Miscellaneous	19	0
Total	1710	36 or 2.1%

Although the postoperative mortality rate is given, the present study places emphasis on statistical data from an anesthetic viewpoint. Of these 36 deaths there is only one case that may possibly be attributed to the anesthetic and a case report will be given later. Consulting *Table 1* it is noted that more than twice as many gynecologic operations were done as of any other single type. We feel that pontocaine is ideally suited for gynecologic operations and we use it routinely, as our results have been satisfactory. Appendectomies, hernioplasties and hydroceles account for 577 of our cases, and we use pontocaine for all these on 'teen age and adult patients unless there is some contraindication.

We find pontocaine especially suitable for genito-urinary surgery, since a large majority of these patients are advanced in years and have some degree of hypertension, as it does not cause as much fall in blood pressure as some of the other drugs and also because it is safe in the presence of high frequency electrical instruments and affords anesthesia of sufficient length for these procedures.

Some authors do not advise the use of spinal in upper abdominal work and others report varying degrees of success. In our hands, pontocaine has been very satisfactory in offering ideal operating conditions which in turn make for lessened postoperative morbidity. Here again the length of anesthesia plays an important part as these operations generally require longer than the ordinary procedure and pontocaine meets this requirement well. In most of our 52 cases of gastric and gallbladder surgery we have used what has been termed "balanced spinal anesthesia" as first suggested by Lundy. By the term balanced spinal anesthesia is meant "a combination of premedicating drugs and minimum dosages of various anesthetics which allow the use of a maximum concentration of oxygen."

"This technic has proven of great value to anesthesia in obtaining a better preparation of the patient, with a quiet, uncomplicated induction, followed by a smooth maintenance of anesthesia with an uneventful recovery for the large majority of patients" (Wiggin[1]). In our work we carry the spinal high enough to provide sufficient relaxation for the operation to be done and supplement this with cyclopropane analgesia to prevent retching or vomiting which, if they occurred, would defeat the purpose of the spinal anesthesia. Balanced spinal anesthesia is also a safe method to be used in those borderline cases in which total spinal or inhalation anesthesia is contraindicated.

Operations on the lower extremities afford many different conditions in which pontocaine is suitable because of the relaxation it gives and ability to use it in the presence of x-ray and fluoroscopic equipment. In our 68 cases on the lower extremity all conditions from "nailing hips" to extensive dissection of varicose veins were represented.

Whenever possible we try to use pontocaine for abdominal drainage. Our results in 54 cases, the large majority following rupture of the appendix, are very gratifying and in no case has there been the subsequent development of a subdiaphragmatic, hepatic or post-peritoneal abscess.

In our series, 44 rectal cases were done and included operations for hemorrhoids, ulcers, fistulas and ischiorectal abscesses. Of the 28 exploratory laparotomies all quadrants of the abdomen were represented, which is also true of the 31 intestinal operations. Approximately one-fifth of the intestinal operations were the result of gunshot wounds of the abdomen. The 8 cases of intestinal obstruction represent only those done in the acute stage. Six of the 8 cases and 3 of the 4 deaths were in negroes who usually presented themselves for treatment three to four days after the onset of acute symptoms. We find that most of the patients have an involuntary bowel movement on the table shortly after induction of the spinal. In this connection was one very interesting case.

This was a case of Hirschsprung's disease in a 10-year-old white girl. She had previously had two laparotomies with only temporary relief. At the time she was given a therapeutic spinal, she had enormous distention of several days' duration and all other methods of treatment had failed. After giving her the spinal nothing happened for 15 minutes, and then she had a very profuse bowel movement to the extent of about 4 quarts. That was about a year ago and since then she has steadily improved and has required no further hospitalization.

The 19 miscellaneous procedures include pilonidal cysts, sympathectomy for hypertension and plastic operations.

Table 2

Sex	Cases	Per Cent
Male	682	39.8
Female	1028	60.2
Color		
White	1037	61
Colored	673	39

Table 2 shows that the number of female patients is about the usual incidence of operative procedures as to sex, and of the 1,710 cases 61 per cent were white patients.

Table 3.—The youngest patient in our series was 10 years old and the oldest was 78. The use of any spinal anesthesia depends on the cooperation of the patient, and we use it very rarely on patients under 14 and only in those of that age from whom we can expect a reasonable degree of cooperation. Those patients under 20 who have had a spinal all expressed satisfaction.

Table 3

Age	Cases	Age at Death
10-15	27	0
16-20	161	0
21-30	489	5
31-40	582	8
41-50	268	9
51-60	111	9
61-70	65	3
71-78	7	2
Total	1710	36 or 2.1%

Of 188 cases between the ages of 10 and 20 there was not a postoperative death. In our series the greatest percentage of postoperative deaths occurred in the age groups of 51 to 60 and 71 to 78.

Table 4

OPERATIVE RISK OF THE LAST 942 CASES

Risk	Cases	Per Cent
1	694	73.8
2	208	22.0
3	35	3.7
4	5	0.5

Twelve had pulmonary tuberculosis.
One had a pneumothorax.

ABNORMAL BLOOD PRESSURES IN 1,710 CASES

Hypertension	317	18
Hypotension	88	5
Total	405	23%

Table 4.—In evaluating the operative risk of our last 942 cases we used the scale 1, 2, 3, 4 for rating signs and symptoms. Thus "1" means good risk; "2" means fair risk; "3" means poor risk; and "4" means that the patient is so seriously sick that death is likely unless the downward progress is quickly reversed. Seventy-three and eight-tenths per cent were considered as good risks, while 27.2 per cent had one or more adverse factors present which in varying degrees could contribute to a disastrous outcome. Eleven of the twelve cases with tuberculosis had an uneventful recovery, as did the patient with the pneumothorax.

As regards blood pressure, we considered those patients with a systolic pressure of 140 or above as hypertensive and those with a systolic of 100 or below as hypotensive. We have not considered that extremes in blood pressure *per se* were contraindications to spinal anesthesia, but were guided more by the individual case and the type

of operation to be done. Since pontocaine causes less drop in blood pressure than procaine hydrochloride, it can be used with more safety in patients with extremes of blood pressure. In this connection we have found "neosynephrin" to be more satisfactory than anything else in combating falls in blood pressure. It does not give untoward reactions as epinephrine sometimes does; its action is prompt and usually sustained by one dose, and it slows the pulse. By slowing the pulse it promotes a better stroke and minute output of the heart.

Table 5

DOSE OF PONTOCAINE

Amount	Cases	Per Cent
5-10 mg.	102	5.9
11-15 mg.	1495	87.5
16-20 mg.	113	6.6
SUPPLEMENTED ANESTHESIAS		
Reason for supplementing:		
Balanced spinal anesthesia	43	2.5
Inadequate or no anesthesia	29	1.6
Others	129	7.5
Total	201	11.6

By far the large majority of our cases have been done with an 11-15 mg. dose of pontocaine (*Table 5*). We find that this practically always suffices for work up as high as the umbilicus. The 5-10 mg. doses were always used for rectal cases and transurethral work. The dose we use rarely exceeds 18 mg. and the largest dose we have used is 20 mg. It is our finding that by the addition of glucose a slightly smaller dose of pontocaine can be used to provide as high anesthesia as a larger dose without glucose.

In this series we have encountered only two instances of reaction due to the pontocaine and this low incidence is probably explained by the routine use of a barbiturate preoperatively and by the fact that we use as low dosage of pontocaine as possible, but not at the expense of satisfactory anesthesia. We have found the average duration of surgical anesthesia to be one hour and 15 minutes to one hour and 30 minutes. The longest one lasted two hours without any complaints from the patient. In the induction of pontocaine anesthesia three patients were given two injections. The onset of complete surgical anesthesia is usually about five minutes after injection. The second, third and fourth lumbar spaces were the sites of injection with the largest majority at the third.

All cases that required supplementary anesthesia were given cyclopropane and we have found it to be ideal for this, especially because of the high oxygen concentration used. There were 43 cases of balanced anesthesia, all of which were for upper abdominal operations. In 29 cases, a percentage of 1.6, there was inadequate anesthesia or failure. Of the 129 other cases that were supplemented some were done at the request of the patient, others for apprehension or retching and vomiting. We never hesitate to use cyclopropane if we feel that it will produce a smoother anesthesia and no difficulties or increased incidence of complications have been encountered with such a practice.

Table 6

	Cases	Per Cent
Nausea	171	10
Vomiting	89	5.2
Patients requiring one or more catheterizations:		
Gynecology	346	47.8
Others	209	21
Total	555	32 Av.

Most of the cases of nausea and vomiting occurred in upper abdominal exploration or operations (*Table 6*). Mesentery tug was the contributory factor in quite a few. The site of the operation and the individual patient determine to a large extent the frequency of catheterization regardless of the type of anesthesia. We are told that there are fewer patients requiring catheterization with our present method of anesthesia than in the old days of ether-nitrous oxide anesthesia at the Employees' Hospital.

Table 7

COMPLICATIONS

Major Chest Complications	Number
Bronchitis	8
Atelectasis	9
Pneumonia	1
Pleurisy	1
	19 or 1.1%
Other complications of note	
Parotitis	1
Trophoneurotic gangrene of great toe	1

Table 7.—All of these complications occurred within the first five postoperative days. Pontocaine was chosen as the anesthetic in a considerable number of patients who had upper respiratory infections at the time of operation, especially in the younger age groups, as inhalation anesthesia was contraindicated. There has been

no attempt to enumerate the minor upper respiratory infections postoperatively, as they have been of little consequence. Postoperative headaches have been rare and we attribute this for the most part to the use of a small gauge spinal needle. We have encountered no cases of cord damage, permanent anesthesia or paralysis, palsy, toe or ankle drop. There has not been a case of respiratory failure in this series.

Table 8 is an analysis of 36 deaths from all causes following operation, showing the day postoperatively on which death occurred and the primary causes of death. Autopsy was done in approximately one-third of these cases.

As already mentioned, there is only one case in which death may have been attributable to the spinal anesthetic. The report follows:

A colored male, aged 23, was seized with a sudden sharp pain in the epigastrium 24 hours before he sought medical attention. On admission to the Employees' Hospital the patient was in acute distress. He had been nauseated and vomited several times before admission and had had several bowel movements. There was a negative history of previous gastric trouble. His abdomen was distended and there was a board-like rigidity. There was generalized tenderness, more marked above the umbilicus where he had a small ventral hernia. Blood pressure was 98/60. Respiration was rapid and labored. A diagnosis of strangulated ventral hernia and ruptured gastric ulcer was made. Decompression was instituted and he was given intravenous fluids, to which there was a good response. Five hours after admission an exploratory laparotomy was done under pontocaine anesthesia, using a dose of 14 mg., and the anesthesia was carried up to T 6. Ten minutes after the operation was started the blood pressure began to fall and five minutes later it could not be obtained.

The pulse became weaker and after a short time was imperceptible. As soon as the blood pressure began to fall he was given 1 c. c. of 1-2,600 ephinephrine and oxygen and intravenous fluid were started. As soon as the heart stopped he was given "coramine" and some epinephrine intracardially. Respiration ceased shortly after the heart, and artificial respiration with oxygen was immediately instituted. All attempts at revival were unsuccessful and the patient expired one hour after the anesthetic was given.

At operation a strangulated ventral hernia and perforated duodenal ulcer with generalized peritonitis were found. The closure had been started when the patient died. The main question that arises is whether there was an error in judgment in giving this patient a spinal anesthetic, yet, on the other hand, could he have stood inhalation anesthesia sufficient to carry out such an operation? Since this case we have had others with the same operative condition with very good results.

Table 8

DEATHS FROM ALL CAUSES

Type of Case	No.	Postoperative Day of Death	Cause
Malignancies	10	3-34	Carcinoma or sarcoma of various organs
Intestinal obstruction	4	1-9	Intestinal obstruction with gangrenous intestine. Peritonitis
Urological	1	84	Peritonitis. Uremia
Urological	1	5	Bladder ruptured during resection. Peritonitis. Urinary suppression
Urological	1	4	Urinary extravasation
Urological	1	5	Hemorrhage. Hypertrophy of prostate
Urological	1	5	Bilateral renal calculi. Pyelonephrosis
Gastric	1	79	Ruptured gastric ulcer. Abscess
Gastric	1	11	Cerebral embolus
Lower extremity	2	4 and 30	Diabetes. Arteriosclerosis
Gynecology	1	14	Hypertension. Cerebral hemorrhage
Gynecology	1	8	Coronary embolus
Gynecology	1	2	Delayed postoperative shock. Circulatory failure
Gynecology	1	10	Acute nephritis. Urinary suppression
Gynecology	1	7	Bilateral ectopic pregnancies. Peritonitis. Gangrene of rectum
Abdominal drainage	1	5	Appendical abscess. Hypertension
Abdominal drainage	1	13	Stricture of rectum with perforation
Abdominal drainage	1	39	Appendical abscess. Pulmonary tuberculosis with cavitation
Appendectomy	1	7	Acute appendicitis. Peritonitis. Atelectasis
Hernia	1	7	Myocardial failure
Intestinal	1	5	Gunshot wound of abdomen. Peritonitis
Exploratory laparotomy	1	7	Nephritis. Uremia
Gastric	1	1 hour	Ruptured gastric ulcer. Generalized peritonitis

A large part of the success of our methods of anesthesia is due to the close cooperation between the medical, surgical and anesthetic staffs. The anesthetist is called as a consultant in every case to be operated upon and final choice of anesthetic rests with him, as do orders for the preanesthetic medication. The anesthetist also directs the immediate postoperative treatment. We visit the patient before every operation and explain to him what anesthetic will be given and what he can expect, and in this way we try to gain the confidence and cooperation of the patient because this determines to a large extent the success or failure of any good anesthetic.

SUMMARY

(1) One thousand seven hundred ten cases of pontocaine spinal anesthesia are reported.

(2) Pontocaine is a safe and efficient anesthetic.

(3) We recommend the pontocaine-glucose method of Sise.

(4) Only two reactions from pontocaine were encountered.

(5) An analysis of 36 postoperative deaths is given.

BIBILOGRAPHY

1. Maxson, L. H.: Spinal Anesthesia. Philadelphia: J. B. Lippincott Co., 1938.
2. Wiggin, S. C.: Anes. and Anal., **18**:193-195, 1939.
3. Marvin, F. W.: Anes. and Anal., **16**:345-349, 1937.
4. Saklad, Meyer: Amer. Jour. Surg., **34**:519-530, 1936.
5. Robinson, E. B., Jr.: Jour. Med. Assn. of Ala., **7**:321-325, 1938.

DISCUSSION (*Abstract*)

Dr. Frank H. Bassett, Hopkinsville, Ky.—In my part of the country we use very few spinals, considerably less than 1 per cent. I came to the conclusion early that there was no advantage in spinal anesthesia over inhalation anesthesia, and a good deal of disadvantage. Dr. Robinson says that spinal anesthesia is the safest anesthetic, yet his deaths are 1 in 1,700. That percentage is a good deal higher than mine. I have had no difficulty with nitrous oxide and oxygen, which I use practically routinely. I probably use nitrous oxide and oxygen in 95 per cent of my cases.

I have given only 22,000 anesthetics, but I have not had deaths at the rate of 1 in 1,700.

With the few spinals I have given, I have had relaxation, but practically little better than with inhalation anesthesia.

Another objection I have raised to spinals is the premedication. You give them procaine and cocaine derivatives, ephedrine and other agents. In other words, you show at the outset that you are afraid of the anesthetic and when you are afraid of anything, you do not get good results.

We rarely use locals for any purpose. We use nitrous oxide oxygen.

I talked recently with a physician who uses 90 per cent spinals. He told me that he used them because he had no anesthetist.

I cannot conceive of why anyone should prefer or use a spinal anesthetic when he can use inhalation.

Quite a few operations last an hour and an hour and a half or two hours, and even more. Spinal would not be applicable in those cases. Advocates of spinal anesthesia tell you that they always have cyclopropane and nitrous oxide ready to use if necessary. If eventually, then why not start with it?

Dr. Perry P. Volpitto, Augusta, Ga.—We have not used as much spinal anesthesia as Dr. Robinson uses in his locality nor have our results been anywhere near so fortunate. Dr. Robinson mentioned the use of vasoconstrictors. I should like to ask him if he employs any criteria for their use or merely administers them when the blood pressure fails or uses them routinely.

Dr. Dougal M. Dollar, Louisville, Ky.—Spinal anesthesia is not a method for anybody to use who is giving one or two anesthetics a week. It must be carefully studied and the cases evaluated.

Having given about 20,000 spinal anesthetics, I think they provide better relaxation than any other method. Spinal should not be given to every patient. The cases that we get in public institutions are often horribly neglected. It is not unusual for us to have a case enter the hospital with an intestinal obstruction of four or five days' standing, with fecal vomitus, which is not a diagnostic point except that it means that the patient is dying. We have got to do something for him. If our mortality with spinal anesthesia is a little bit higher than it is in private practice, I think that it is due to the type of cases that we are dealing with.

In my own private work, I have lost three patients on the table. In work in the public institution, I have lost a great many more. But I still think that there is no anesthetic in the world that gives the relaxation that spinal does, and in selected cases recognizing the contraindications, it is the anesthetic of choice for the convenience of the surgeon and for the speed of the operation. We can get anesthesia in the lower abdomen for two and one-half to three hours. I do not think that any surgery should be done that will require much more time than that. When you speak of forty-five minutes of anesthesia, you are speaking of procaine alone. Procaine alone is certainly not a drug of choice for all spinals. For certain types of work, rectal work or work on the perineum or lower extremities, it will answer, but for gastric surgery or gallbladder surgery, you have to use more than procaine. The combinations or with the use of pontocaine, certainly give beautiful anesthesia.

Dr. Louis H. Ritzhaupt, Guthrie, Okla.—I was a little afraid the statistics I gave in my paper might be questioned. While I dealt with private patients only, our mortality rate, in general, with the county charges included, is about the same as his.

You surgeons who have not used the type of anesthesia which Dr. Robinson has reviewed, have never operated upon a relaxed abdomen. You can complete the operation in half the time and do it better under this type of anesthesia than under any other type. The use of cyclopropane and oxygen is an adjunct, more psychic than necessary.

Dr. Robinson brought out the value of dealing directly with the patient before the time of operation. I hope the anesthetists recognize the fact that a large amount of psychology can be used with the men and women and children to whom the anesthetic is administered. If the anesthetist becomes acquainted with them, he can have the same type of influence over them that the surgeon has. That is a big factor which should not be neglected.

If each anesthetist will study the same "Elements of Psychology" which the nurses study in the training schools, they will be able to deal with their patients much more easily. We can do a lot with the mind, almost as much as we can with the anesthetic, especially up to the time the patient is put to sleep. That is why the physician who opened the discussion of the paper has good results with nitrous oxide and oxygen. He has a personality which is dominating and controls the patient. Therefore, he gets good results with nitrous oxide and oxygen.

A nurse may run in and give the anesthetic without any thought or previous connection with the patient. But you gentlemen here who are graduates of medicine naturally establish confidence. The surgeons are going to depend more and more upon you to make surgery easier and the operating time less.

Dr. Frank H. Bassett, Hopkinsville, Ky.—Last night about 9 o'clock I was called to the hospital and found a patient on the operating table. His face was very much flushed and he was very much excited. He looked at me and said, "Doc, I have got two strikes on me now."

I said: "This is going to be a straight one right over the center. You will be all right."

Before I could get the mask on his face it cleared up. He was grinning, and I had no trouble with him whatever.

Dr. Merrill C. Beck, New Orleans, La.—We have not looked quite far enough into the spinal anesthesias. We talk only about the mortality on the table. We have spoken of nitrous oxide anesthesia with very little mortality. In our hands, we cannot get relaxation with nitrous oxide. It takes ether or occasionally cyclopropane for upper abdominal work, and I feel that almost anybody who uses nitrous oxide and oxygen must add ether to get upper abdominal relaxation, or else it is asphyxia, not anesthesia. Therefore, spinal is quite applicable here. On the table, you will undoubtedly lose more patients under spinal, but two months later, how many of them will be living? In other words, it takes such a depth of general anesthesia to approach the relaxation you get with spinal that I think it is much worse on the patient. Dr. Lahey has shown in his clinic that in upper abdominal work, other things being equal, two months later you will have twice as many patients alive after spinal as after general.

Dr. Eldon B. Tucker, Morgantown, W. Va.—This paper brings out that fact which we all know, that the results depend more on the anesthetist than they do on the agent which he employs.

Dr. Robinson was quite honest in his evaluation of the complications. In our community I could give more spinals if I were willing to do so. Our surgeons like spinal anesthesia. Very often they insist upon it. As to the complications, I recently had a case which I believe had a very definite pneumothorax the next day after a spinal. I wonder how often that occurs or if that has occurred more than once in Dr. Robinson's cases.

We continue to use spinal in cases in which we are afraid are going to get chest complications or which have a particular indication for the use of spinal, but we have just as many complications when we use a spinal as when we use a general. I think that the more proficient we become in the use of the general, the less indication we are going to see for spinal.

Dr. B. C. Willis, Rocky Mount, N. C.—I should like to ask Dr. Robinson whether all the cases that received anesthesias at the hospital during that period were spinals or if other types of anesthesia were used.

Dr. G. H. Bunch, Columbia, S. C.—This discussion has been limited to the comparative mortality rate of inhalation anesthesia and spinal. The very material factor of postoperative morbidity has not been touched upon. In abdominal surgery, complete relaxation is absolutely essential to good work. Without it, adequate exposure of the operative field is often impossible, dissection hazardous and the control of bleeding difficult. With relaxation, there is no straining, no tendency to evisceration. Visceral manipulation may be done gently with minimum trauma. Finally, the incision in the abdominal wall may be closed with the tissues at rest and falling together instead of having to be pulled together for approximation. Laparotomy done in this way will have but little postoperative reaction and will be followed by a minimum of postoperative adhesions.

When the patient is dismissed from the hospital the operation is over for the surgeon; for the patient, it is only beginning, for he has to live with the operation the rest of his life. Woe be to him if he has to endure the pain and the disability of crippling adhesions over the years that remain.

In my experience spinal anesthesia, by affording complete relaxation, insures a material decrease in morbidity, which makes it safer and better for abdominal work.

Dr. Louis H. Ritzhaupt, Guthrie, Okla.—With the use of pontocaine and glucose, the specific gravity is in accordance with that of the spinal fluid, the anesthesia lasts two and three hours and there is even a partial relaxation of the abdomen for a period of five hours afterwards. The intestines are quieted and the adhesions are less, as Dr. Robinson brought out.

Another advantage is that the intestinal distention is considerably less. It is customary when the case is not acute, to give on the first morning after the anesthesia some of the hypodermic cathartics, followed by a colon tube and small enemas. We keep the intestines completely empty, with no gas, and the patient is comfortable and makes a good recovery.

The patients will forever thank you for this type of anesthesia, and as its use grows in the community, they demand it. I practice in Guthrie, which is a small country town, and in Oklahoma City. The patients whom I operate upon sell it to others. It is not uncommon for them to come to me, because I am practically the only one in the community of Guthrie who uses this type of anesthesia.

Dr. Robinson (*closing*).—When I said that I consider spinal anesthesia to be the safest and quickest, I meant with the reservations that I brought out, that is: proper selection of cases for its use, with a meticulous technic, by a man who understands different drugs and agents or thoroughly understands a particular method that he happens to be using. Under those conditions and in its particular field, it is the safest and quickest anesthetic.

The one death which we had occurred in the first 500 of this series. Since then, in the later cases, we feel that we know more about pontocaine spinal anesthesia than we did at first.

Down in our community more and more patients request spinal anesthesia. They say they do not want to go to sleep. Of course, we do not give them the spinal because they ask for it. If they should have a spinal they get it, because we feel that is what would be best for them in that particular case. On the other hand, we have some patients who request ether. We give them whatever we think is best for the particular case.

As to the use of vasoconstrictors: in our local, before we give the spinal, we use 1 c. c. of 1/2,600 epinephrine and we use a similar drug later in the operation if we get a drop in the blood pressure. Whether we use "neosynephrin" depends on what the blood pressure was at the beginning of the operation. If it is a case of hypertension, around 170/100, of course we give the vasoconstrictor before the blood pressure falls down around 80 systolic. If the patient starts with a blood pressure of 120/80, we let the pressure fall to about 70/80 before we give "neosynephrin."

In our method of spinal anesthesia, we use 4 to 5 minims of the 1 per cent solution of pontocaine to provide anesthesia at the site of injection. So far we have encountered no trouble from this practice. However, it is not recommended for general use in local infiltration. In a way, its use in the local would be a good diagnostic test to tell whether the patient will be sensitive to the full therapeutic dose of pontocaine for spinal anesthesia later on.

One of our patients had a pneumothorax before operation. That was one reason why we used a spinal. A white woman about 29 years old had pulmonary tuberculosis and a pneumothorax for collapse therapy had been done. Since I collected my figures for this paper, about two weeks ago, we had another patient having bilateral renal calculi with pulmonary tuberculosis. He also had a pneumothorax at the time of operation and has had an uneventful postoperative recovery.

We use all of the accepted anesthetic agents of the day, cyclopropane, ether, nitrous oxide, etc. We use no tribromethyl alcohol, however. Since we have used cyclopropane, we have felt tribromethyl alcohol unnecessary.

Practically all the patients we give ether to are children. All the other patients have either cyclopropane, sodium ethyl thiobarbiturate or spinal anesthesia.

The question of morbidity, I think, is one of the most important things in connection with spinal anesthesia. We find that our patients can take a general diet about twenty-four hours sooner than they can following inhalation anesthesia. There is less distention. The patients are usually more comfortable sooner after the operation.

THE PROPHYLACTIC USE OF TETANUS ANTITOXIN*

AN ANALYSIS OF 500 CASES

By CECIL E. NEWELL,
M.D., M.S. (SURG.), F.A.C.S.
Chattanooga, Tennessee
and
CHARLES MCVEA, B.S., M.D.
Baton Rouge, Louisiana

Luckily for most physicians today, tetanus is a relatively rare disease. We say this because frequently we see traumatic cases treated elsewhere which have not received a prophylactic dose of tetanus antitoxin. On the surgical service at the Newell Clinic and Hospital, we routinely give all patients with a break in the skin a prophylactic injection of tetanus antitoxin. This procedure is not omitted unless we feel, as we rarely do, that the possibility of contamination with the tetanus bacillus is practically impossible. We frequently have to defend this practice, and hear often that because of the present day trend of giving different antitoxins and serums for the prevention and treatment of numerous diseases, there is danger in the reactions from tetanus antitoxin. For quite a while we have felt that some brands of tetanus antitoxin caused more reactions than others. It was definitely to determine the veracity of these and other popular assumptions regarding the prophylactic use of tetanus antitoxin that the following study was undertaken.

Material.—This work is composed of a rather painstaking history and follow-up of 500 consecutive cases receiving tetanus antitoxin as a prophylactic measure. Although we frequently employ gas and tetanus antitoxin combined, obviously these cases were not included. Those patients whose trauma was so great that they died within the first two weeks following their prophylaxis were purposely omitted. Likewise, the patients who for any reason were not seen after their first visit were also excluded. The analysis of this series of 500 cases forms the basis for this report.

Incidence.—Of the 500 persons receiving prophylactic injections of tetanus antitoxin, there were 415 males and 85 females. In age, they

*Read in Section on Surgery, Southern Medical Association, Thirty-Third Annual Meeting, Memphis, Tennessee, November 21-24, 1939.

ranged from 11 months to 71 years, but the large majority were young adults: 373 were white and 127 colored.

History.—Ninety-four patients (18.8 per cent) gave a history of previously having received serum. Of these, 88 (93.6 per cent) had been given some form of prophylactic antitoxin, while only 6 (6.4 per cent) had received serum for therapeutic purposes. It is interesting to note that 9 (9.6 per cent) of the 94 patients previously receiving serum recalled a reaction that they experienced from its administration.

The history of other allergy was closely checked in all patients. The most frequent type was asthma. This occurred in 2 per cent of the 500 patients. No "horse asthmatics," however, were discovered. Hay fever was a close second, its incidence being 1.9 per cent. History of urticaria, exclusive of previous serum reactions, was obtained in only 1 per cent of the patients.

SENSITIVITY TESTS

Although the scratch and conjunctival tests have been recommended, we employed only the intradermal method. No dilution of the antitoxin was made for the test, and no amount recorded, although the quantity of serum used in this manner approximated 0.1 c. c.

Skin tests were employed in 92 of the 500 patients receiving prophylaxis. This is less than one in every five. Of the 92 tests performed, 37 were negative while 55 were positive.

ADMINISTRATION

One hundred doses each of five different brands of antitoxin were used. The dose of antitoxin varied from 500 to 3,000 units, but in 486 (97.2 per cent) instances it was 1,500 units.

The antitoxin was injected both subcutaneously and intramuscularly. The subcutaneous tissue of both arms as well as right and left deltoid and gluteal muscles were used. The muscles were used approximately ten times more often than the subcutaneous site.

In 24 instances the dose was divided and given in several increasing fractions. The remaining 476 patients received their antitoxin in a single injection. This indicates that in only one out of every twenty patients did we deem it necessary to administer the antitoxin by a desensitizing procedure.

REACTIONS

Of the 500 patients receiving tetanus antitoxin, 59 (11.8 per cent) developed a reaction of some kind. Because 17 of these patients suffered both a local and a general reaction, there were 76 reactions in all (*Table 1*). Of the patients who exhibited reactions, 30 per cent gave a history of previously receiving serum.

Table 1

SUMMARY OF REACTIONS FOLLOWING THE PROPHYLACTIC INJECTION OF TETANUS ANTITOXIN IN 500 PATIENTS AT THE NEWELL CLINIC AND HOSPITAL

Antitoxin		Reactions				
			Delayed			
Brand	No. Patients	Immediate	Local	General	Total	No. Patients
"A"	100	0	12	8	20	14
"B"	100	0	11	1	12	11
"C"	100	0	7	4	11	8
"D"	100	1	10	2	13	11
"E"	100	2	11	7	20	15
Total	500	3	51	22	76	59

According to the time of their appearance, reactions were termed "immediate" or "delayed." The former were thought to have been noted in three instances. One occurred in a young girl who two years previously had received 22,000 units of antitoxin in the treatment of diphtheria. Her skin test was strongly positive to tetanus antitoxin. This girl was desensitized in the routine manner and immediately following the last, or bulk, dose of antitoxin she developed a localized area of urticaria at the site of injection.

Two other patients immediately following the administration of 1,500 units of tetanus antitoxin became pale, weak, nauseated, developed tachycardia and broke out in a cold sweat. One of them had previously received a prophylactic injection of tetanus antitoxin. This young man soon vomited, then fainted. Ten minims of adrenalin hydrochloride were administered subcutaneously, and within a few minutes he had recovered sufficiently to walk out. The other patient, a young girl, promptly responded to a drachm of aromatic spirits of ammonia. These patients had undergone emergency surgery under local procaine hydrochloride anesthesia, and as

none of them later developed delayed reactions of any kind, it is quite possible that the syncope in the last two was psychic or traumatic in origin rather than allergic. The small local reaction the first patient experienced amounted to no more than her positive skin test.

Delayed reactions developed in 56 patients. The amount of delay was found to vary from two hours to ten days. Local reactions usually made their appearance first. The so-called "sore arms" developed in most patients the day they received the injection. This local manifestation was the most common of all reactions. It characteristically consisted of redness, swelling, heat, pain and tenderness deep in the muscle about the site of injection. This syndrome rapidly developed within a few hours to a day or two, and as rapidly disappeared. An occasional case developed axillary adenitis on the affected side. Possibly a more annoying local condition developed in a smaller number of patients. This consisted of superficial edema, erythema and urticaria with burning and itching of the skin about the site of puncture. As a rule this type of reaction developed later and persisted longer, although it sometimes would come and go for several days. The most distressing but rarest of the local reactions consisted of a combination of the deep and the superficial symptoms.

The only patient in the series who developed an abscess at the site of injection had previously been given tetanus antitoxin. The abscess was small, and superficially located. Drainage was established by simply lifting off the crust, after which prompt healing occurred.

Treatment of local reactions often consisted in reassuring the patient that his sore arm was a frequent result of the antitoxin, and that it was not serious. However, where the patient sought relief, a dressing of some soothing emollient such as calamine liniment was applied to the affected part.

Delayed general reactions, often referred to as "serum sickness" or "serum disease," occurred in 22 patients (4.4 per cent). In two instances they preceded a local skin reaction, in five instances they occurred without any local symptoms, and in the remainder they followed a local reaction. As a rule they made their appearance from the fifth to the eighth day following injection. These patients characteristically exhibited some degree of general malaise, slight fever, moderate local reaction, mild adenopathy, puffiness of the eyelids, but more than anything else, urticaria! This was very variable in duration, distribution, and discomfort, but was invariably the chief complaint. General reactions developing in less than five days consisted mainly of mild transient malaise, nausea, slight fever, or aching in the joints accompanying a local reaction. The most severe reactions included all of the symptoms of serum sickness and in addition vomiting; generalized urticaria; edema of the face, eyelids, and extremities; adenitis; and loss of appetite and weight. Only two such cases (0.4 per cent) occurred.

Treatment of general reactions was more elaborate than that instituted for local manifestations, though here again the reaction was minimized. This diplomatic tendency toward the patient to reassure him that his unpleasant experience was neither unusual nor serious was found to be definitely advantageous in handling the case, for most of the patients were frankly alarmed and often disgruntled.

Soaking in a tub of cool or cold water, then drying without the use of a towel, gave relief to many patients. This was found to be the best home remedy for urticaria. Avoidance of overheating and over-exertion was urged. Plain calamine liniment was used to advantage for the itching. One per cent phenol was occasionally added to increase analgesia. Sedation with phenobarbital, pentobarbital sodium, and occasionally codeine was found to be invaluable. A saline laxative or milk of magnesia was routinely ordered.

If the patient was seen while urticaria was manifest, epinephrine was given subcutaneously. Three to five minims were most often given, sometimes ten. It was administered slowly, occasionally taking as long as twenty minutes to complete the injection. When this preparation afforded relief, it was dramatic; the itching would rapidly subside and the wheals decrease, sometimes while you watched.

As a substitute for epinephrine, ephedrine was found quite useful. It was often combined with pentobarbital sodium, 3/8 of a grain of each, and administered in a capsule at the first sign of the rash. This procedure apparently aborted some reactions and alleviated others.

Only two patients required hospitalization because of reactions. In each instance their stay was less than twenty-four hours.

Reactions in each group of 100 patients receiving a different nationally known brand of

antitoxin were compared. The number of individuals developing reactions from the different brands ranged from 8 to 15 per cent. At first consideration this variation seems large, but the average for the 500 patients was 11.8 per cent. And, as we shall later see, so many factors influenced the patient's sensitivity to antitoxin that the variation from the average exhibited by the two extremes could normally fall within the scope of these and other influences. We feel that our results tend to portray, not that the reaction-producing elements of one brand of antitoxin are more or less than another, but that sensitivity to an antitoxin depends upon various factors in the individual. And, no matter what brand is used, only one person out of nine should experience any reaction from the administration of a prophylactic dose of present day tetanus antitoxin.

The factor which increased a patient's chances for a reaction more than anything else was the patient recalling a previous reaction to serum. Forty-four per cent of this group developed a reaction (*Table 2*). Next in order of influence

Table 2

FACTORS IN PAST HISTORY OF PATIENTS WHICH INCREASE THEIR SENSITIVITY TO TETANUS ANTITOXIN

Previous History	Number of Patients	Number of Reactions	Percentage
Serum reaction	9	4	44.0
Therapeutic serum	6	2	33.3
Asthma	10	2	20.0
Prophylactic serum	88	16	18.2
No serum	406	41	10.0

was the group which had formerly received therapeutic serum. The incidence of reactions in this group was 33.3 per cent. Asthmatic patients ranked next with reactions occurring in 20 per cent. Those who previously took prophylactic serum trailed the others with an incidence of reactions in 18.2 per cent of the patients.

Of the 500 patients, 9 gave a history of suffering from hay fever, and 5 others had experienced idiopathic urticaria. The skin test in a majority of these patients was positive, yet not one of the fourteen developed a reaction of any kind.

Study of the seasonal variation gave interesting results (*Fig. 1*). It was noticed that the incidence of reactions was higher in May, June, July and August. It would seem from our results, therefore, that there is an apparent increase in sensitivity to antitoxin in the summer than during the colder seasons.

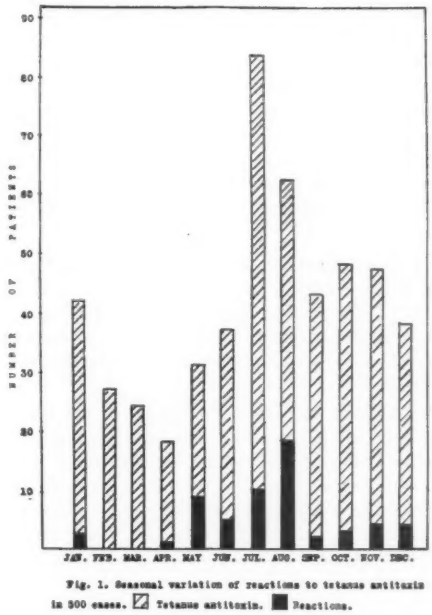


Fig. 1. Seasonal variation of reactions to tetanus antitoxin in 500 cases. Tetanus antitoxin. Reactions.

Fig. 1

COMMENT

Lyall and Murdick, in a series of 1,000 cases in which antitoxin was furnished by the New York Department of Health, found generalized serum reactions to occur in 15.2 per cent and localized reactions in an additional 12.5 per cent. This is a much higher incidence of reactions than occurred in our series.

Hunt had the impression that serum sickness occurred less frequently in negroes than in the white race. In the present series, reactions developed in 11 per cent of the negroes and in 12 per cent of the whites.

Serious anaphylactic accidents[24 4] and even death[13 34] have been reported, but we have never experienced an immediate reaction from tetanus antitoxin that even approached being alarming.

Accounts of various local nerve paralyses[2] appear now and then, and atrophy of the injected muscle[17] has been noted. Young, Doyle and others[23 3] have seen distant peripheral nerves paralyzed. Still others[7 28 29 1 10] have found the cranial nerves to be involved. Noth-

ing of this nature has developed in any of our patients. We therefore conclude that they are quite rare.

Several investigators[34 18 22] have attempted to prevent reactions by the administration of epinephrine mixed with the tetanus antitoxin. Whereas this procedure may reduce the number of reactions, it does not prevent them, as we noted two moderately severe reactions following its use.

Yodh attributed much benefit to the administration of calcium in the prevention of serum sickness. We prescribed calcium gluconate in one-gram doses three to four times daily in many cases in our series, but were not impressed with its usefulness.

Reports of lockjaw's occurring after the administration of tetanus antitoxin are not uncommon.[5 8 14 19 21 27] One of us (Newell) treated such a case after the tetanus developed in a girl who had sustained a compound fracture of the left radius and ulna. At the time the fracture was reduced elsewhere, she was given 1,500 units of tetanus antitoxin, and ten days later she developed lockjaw. This girl died the day following admission to our service. Since this experience, five years ago, we have made it a rule to give all patients with compound fractures, gunshot or large penetrating wounds an additional 1,500 units of antitoxin at the end of a week.[11 15 26 30 31 35] If the wounds are extremely large or severely contaminated we sometimes give a third or even a fourth dose.[12] Tetanus following two or more doses is extremely rare, although it has been seen.[32]

We are watching the future with interest to see if tetanus toxoid for the active immunization against lockjaw[6 16 20] will prove of real worth. But we have at our command today in tetanus antitoxin a proven prophylactic agent for that dread disease, and its injection, in spite of the increasing use of various serums, seldom occasions untoward effects.

The aid rendered by Drs. W. C. McCurdy, S. W. Brown, W. B. Hahn and R. S. Hellman in collecting material for this study is hereby gratefully acknowledged by the authors.

BIBLIOGRAPHY

1. Amberg, A.; and Hewitt, R. S.: Tetanus, Tetanus Antitoxin or Phenobarbital Deafness. J.A.M.A., **105**:585-586 (Aug. 24) 1935.
2. Ball, C. R.: Paralysis Following Injection of Antitetanic Serum. U. S. Nav. M. Bull., **37**:305-309 (April) 1939.
3. Brahdy, L.: Musculo-spiral Paralysis After Serum Injection. Ann. Int. Med., **16**:1911-1912 (April) 1938.
4. Braunlich, G.: Anaphylaxis Following the Injection of 1,500 Units of Tetanus Antitoxin. Jour. Iowa Med. Soc., **17**:450-451 (Dec.) 1927.
5. Carothers, R. G.: Gas gangrene and tetanus in compound Fractures. Am. J. Surg., **28**:821-828 (June) 1935.
6. Cooke, J. V.: Combined active immunization for diphtheria and tetanus. Sou. Med. Jour., **31**:158-161 (Feb.) 1938.
7. Cutter, R. D.: Auditory nerve involvement after tetanus antitoxin; first reported case. J.A.M.A., **106**:1006-1007 (March) 1936.
8. Davis, M. D.: Ten cases of tetanus. J. Tenn. M. A., **16**:55-58 (June) 1923.
9. Doyle, J. B.: Neurologic complications of serum sickness. Am. J. Med. Sci., **185**:484-491 (April) 1933.
10. Editor: Deafness after tetanus antitoxin. J.A.M.A., **105**:1374 (Oct. 26) 1935.
11. Fantus, B.: Therapy of tetanus. J.A.M.A., **102**:2021-2022 (June 16) 1934.
12. Gage, M.; and DeBakey, M.: Tetanus and its treatment. South. Surg., **4**:246-259 (Aug.) 1935.
13. Gurd and Emry-Roberts: Lancet **198**:763 (Feb.) 1934.
14. Hall, W. E. B.: Deaths in tetanus; the phenomenon of toxin release. Canad. M. Assn. J. **38**:460-465 (May) 1938.
15. Halpenny, J.: Tetanus. Canad. Med. Assn. J., **24**:862-869 (Sept.) 1924.
16. Hayden, R.; and Hall, W. W.: Active immunization against tetanus using alum-precipitated tetanus toxoid. U. S. Nav. M. Bull., **36**:524, 1938.
17. Hoagland, R. J.: Neuritis following serum administration. Military Surg. **82**:134-137 (Feb.) 1938.
18. Hunt, L. W.: Recent observations in serum disease. J.A.M.A., **99**:909-912 (Sept. 10) 1932.
19. Irons, E. E.: Tetanus and antitetanic serum. J.A.M.A., **64**: 1552-1554 (May 8) 1915.
20. Jones, F. G.; and Moss, M.: J. Lab. & Clin. M., **24**:512-516 (Feb.) 1939.
21. Klopp, J. W.: Tetanus. Ann. Surg., **104**:419-423 (Sept.) 1936.
22. Kohlenberger, C. F. W.: Personal communication.
23. Kraus, W. M.: Serum disease of the nervous system; report of three cases. Arch. Neurol. & Psychiatry, **37**:1035-1045 (May) 1937.
24. Lowens, H.: Anaphylactic shock. J.A.M.A., **89**:1625 (Nov.) 1927.
25. Lyall, H. W.; and Murdick, P. P.: Tetanus antitoxin; serum reactions following prophylactic injection. New York State J. Med., **38**:1-4 (June 1) 1938.
26. Miller, R. H.: Tetanus; report of 116 cases at the Massachusetts Hospital. Surg., Gyn. and Obst., **36**:90-96 (Jan.) 1923.
27. Miller, R. H.; and Rogers, H.: Present status of tetanus with special regard for treatment: Report of further cases from the Massachusetts Hospital. J.A.M.A., **104**:186-191 (Jan.) 1935.
28. MacCready, P. B.: Inner ear deafness from tetanus antitoxin injection. Ann. Otol., Rhin. and Laryngol., **47**:247-252 (Mar.) 1938.
29. Neffson, A. H.: Recurrent paralysis of the larynx following injection of tetanus antitoxin: report of a case. Arch. Otolaryngol., **27**:201-203 (Feb.) 1938.
30. Newell, E. D.: Gas Gangrene. Ann. Surg., **110**:100-106 (July) 1939.
31. Newell, E. T.: The management of traumatic wounds of soft parts. J. Tenn. State M. A., **27**:331-334 (Sept.) 1934.
32. Sarlin, C. N.: Two interesting surgical experiences. New York State J. Med., **30**:984-985 (Aug. 15) 1930.
33. Stone, W. J.: The treatment of tetanus. J.A.M.A., **78**: 1939-1943 (June 24) 1922.
34. Thomas, C.: Tetanus antitoxin; a study of local and general reactions in 1884 cases; a preliminary report. Texas State Med. Jour., **27**:26-27 (May) 1931.
35. Vener, H. I.: Tetanus. California & West. M., **48**:— (March) 1938.
36. Yodh, B. B.: Observations on the treatment of tetanus; with special reference to tetanus antitoxin. Brit. Med. Jour., **2**:589-592 (Sept. 24) 1932.
37. Young, F.: Peripheral nerve paralyses following the use of various serums; report of a case and review of the literature. J.A.M.A., **98**:1139-1143 (April 2) 1932.

DISCUSSION (*Abstract*)

Dr. William Battle Malone II, Memphis, Tenn.—In some textbooks a traumatic wound is one which is defined as a wound made without surgical intent. Of course there are a great many different types of traumatic wounds, and I do not think that in every case there is an indication for giving tetanus antitoxin. Of course, as Dr. Newell said, in the majority of cases, or in all cases in which it is thought that there was any

possibility of contamination with the tetanus organism the tetanus antitoxin should be given. Although it can never be absolutely stated that there is no possibility of contamination with the tetanus bacillus, at the same time there are cases in which our experience and reason will tell us that there are certainly not absolute indications for giving the tetanus antitoxin where there is no contamination of the wound outside of the house, or where the tetanus bacillus is nearly always found. I think that that should govern us to a certain extent, particularly in cleanly incised wounds, if a proper and a thorough debridement is done, which is usually not necessarily extensive.

There are certain indications which should be considered without, I think, just routinely giving it in all cases in which the skin is broken.

The intradermal test is a most reliable method of testing for sensitivity to any type of serum. Most, or a good many, of the preparations which are on the market now for using tetanus antitoxin contain a small vial which gives a dilution of the antitoxin, a 1 to 10 dilution which can be used, and it is said that perhaps even from 0.1 c. c. of the undiluted serum, a severe reaction may be obtained. However, unless the patient gives a history of some severely allergic state, such as asthma, hay fever, or previous allergy or reaction to serum, I think the straight serum used intradermally in dosage of 0.1 c. c. is all that is necessary.

The incidence of reaction, according to Dr. Newell, in his series is remarkably low. In the experience of most men, the incidence of reaction is much higher.

The question of active and passive immunity is brought up in considering the tetanus bacillus which is comparable to the organism causing diphtheria in that they both produce a soluble exotoxin, and if this exotoxin is properly treated it may be made non-toxic and yet retain the antigenic powers.

Dr. Newell mentioned the alum precipitated tetanus toxoid which has been used quite extensively in some sections of the country. Hayden and Hall, of the United States Medical Corps, have both investigated this subject and have used it practically. Its advantage is that it is thermostable, it is serum free, and avoids allergic reaction. The disadvantage, of course, is that it cannot be given as a tetanus antitoxin immediately following an injury. The patient must have been injected with it previously, using usually two injections ninety days apart, of one c. c. of the toxoid. During that time, in between the injections, he is not immune and he must be given a dose of tetanus antitoxin just the same if an injury occurs in which the antitoxin is indicated. After that time he retains a certain amount of immunity which can be stimulated by a third dose of the toxoid, and bring the titer above what is produced by 1500 units of tetanus antitoxin.

Dr. Edward D. Mitchell, Jr., Memphis, Tenn.—Any disease that has a mortality rate of 50 per cent or more certainly deserves our utmost consideration. Tetanus can be prevented, but after it has developed, even though massive doses of antitoxin, surgical attention to the wound and all supportive measures be employed, the patient is fortunate indeed if recovery takes place.

We do not know where we may encounter the tetanus bacillus for it may be lurking in the dark like an assassin ready to do its deadly work. Since it is harbored in the intestines of animals and deposited on the soil with their excreta it will be found in greatest numbers in barn lots, streets and fertilized fields. Wounds received in such localities will more often develop tetanus than wounds received elsewhere. Many toilers of the soil harbor the tetanus bacillus on their skins.

It is not always in the dirty contaminated or punctured wound that the disease develops. Occasionally it is seen when the wounded tissue is comparatively clean and it is also encountered when no history of injury can be elicited.

In reviewing 100 cases of tetanus admitted to the John Gaston Hospital I was impressed with the fact that five patients gave no history of trauma. Three newborn babies developed tetanus within two weeks after birth. These infants were delivered by midwives in the home and apparently there was no injury or accident during or after delivery. The mothers did not develop the disease. A patient, a candy maker, fell, causing his hand to be immersed in a pot of boiling candy. A third degree burn resulted and fourteen days later tetanus developed.

From these cases it may be seen that tetanus may develop at any time. The death toll in the United States is about 1500 annually.

Only by constantly bearing in mind the possibilities of the development of tetanus and using every precaution to prevent it can these deaths be avoided. Such a simple precaution as soap and water will aid in its prevention and this was proven by a Japanese general campaigning in China who required all of his soldiers to take a bath and attire themselves in clean clothes before entering battle. The incidence of tetanus in his army was decreased from 10 per 100,000 to 1 per 100,000. Therefore it can be seen what a great aid is cleanliness.

All patients with traumatic wounds should receive tetanus antitoxin and when healing is slow or infection develops the prophylactic dose should be repeated at weekly intervals. Should this not be done we shall be laboring under a false sense of security. Dr. Newell has emphasized this fact and it is worthy of repetition.

In the 100 cases of tetanus referred to there were four patients who had received one prophylactic dose of antitoxin and it had not been repeated.

In recent years an alum precipitated toxoid has been developed that gives an active immunity. It is similar to the diphtheria toxoid. There are many advocates of this type of prevention but whether or not it is more effective than the older type now in general use time alone will tell.

Dr. Glenn D. Batten, Jackson, Tenn.—There should be serious consideration of giving tetanus antitoxin to all cases where there is a break in the skin. My routine is to put the burden on the patient or the patient's relatives, and tell them they know as much about it as I do. There is always a possibility. I advise it, and if they do not take it, the responsibility is theirs.

Skin testing should be routine. There are probably several of us in this audience who have had very unhappy experience when we did not test these patients by the skin before we gave the dose.

The initial dose should be repeated. A pretty good plan is to give 1,500 units every week as long as the wound is suppurating, until definite signs of healing take place.

MESENTERIC VASCULAR OCCLUSION*

REPORT OF A CASE IN WHICH OPERATION WAS PERFORMED

By JOHN H. BLUE, M.D.
and
CHARLES R. LAFFERTY, M.D.
Montgomery, Alabama

The mortality in cases of mesenteric vascular occlusion has been reported to be very high, the figures frequently ranging between 50 and 90 per cent. During the past ten years, surgeons have come to realize that these cases are not entirely hopeless. In the literature there have been reported with increasing numbers, cases of recovery following resection of the intestine. It therefore seems opportune to add this case to the list of encouraging results obtained with this highly fatal condition, emphasizing as it does the importance of including this possibility in the differential diagnosis of the acute abdomen, and the obvious necessity of early operative intervention. This is forcibly brought out in statistics from the medical literature. In the series of ninety-two cases reported by Meyer[1] there was a gross mortality of 57.6 per cent, but in forty-three of these cases in which resection was done, the mortality dropped to 32.6 per cent. In eleven cases examined from St. Luke's series, the mortality was 63.6 per cent, one case having recovered without any operative procedure beyond an exploratory laparotomy; but in the four in which resection was done, three recovered, making a mortality of 25 per cent.

The diagnosis of mesenteric vascular occlusion is rarely made preoperatively. This is due to the pathology which may cause symptoms varying from mild distress to a severe shock-like state resembling an acute hemorrhagic pancreatitis.

Trotter[2] found that a correct preoperative diagnosis had been made in only thirteen out of the 360 cases which he had analyzed. Abdominal pain is the predominant symptom in all cases. The pain usually comes on suddenly, but may begin gradually and increase in severity. It may disappear completely to return with increasing violence, as gangrene of the intestine develops. The most characteristic feature of the pain is the fact that it is all out of proportion to the physical findings. Vomiting occurs in about 50 per cent of the cases. There is usually some elevation of temperature, but rarely above 101° F. The leukocyte count is invariably high.

*Received for publication February 20, 1940.

*From the Departments of Surgery and Pathology, St. Margaret's Hospital.

CASE REPORT

The patient, a white man, 66 years of age, was admitted to St. Margaret's Hospital on August 4, 1939, complaining of pain in the abdomen. The present illness began on August 3, 1939, with sudden, generalized sharp abdominal pain, which became progressively more severe. Nausea and vomiting were prominent. There was no history of diarrhea, bloody stools, chills, fever, or constipation. The patient claims to have passed gas.

On admission the patient was a well-developed, well-nourished white male, acutely ill. The temperature was 99° F., pulse 80, respiration 22, and blood pressure 152/86. The head and neck were not unusual. The chest was symmetrical and there were no abnormal findings on percussion or auscultation. The abdomen was rigid and distended, and there was tenderness in the left lower quadrant on deep palpation. No masses were palpated. The genitals and extremities were negative. The blood count revealed 15,750 white blood cells, 87 per cent neutrophils, and 13 per cent lymphocytes. The hemoglobin was 85 per cent and the red blood cells were 4,200,000. The urine was entirely negative. A diagnosis of an acute surgical lesion in the abdomen which was probably acute appendicitis was made.

The abdomen was explored through a McBurney-Wier incision. On opening the peritoneal cavity there was seen a large quantity of blood-tinged peritoneal fluid. Exploration of the small intestine revealed a lesion approximately in the middle portion of the ileum, measuring three feet in length. The bowel was edematous, thickened, and hemorrhagic. Resection of the involved small intestine and mesentery with end-to-end anastomosis was performed. The wound was closed in layers with no drainage. The specimen consisted of a segment of the small intestine measuring 60 cm. in length. It was of a dark purplish red color, edematous, and the lumen was filled with hemorrhagic fluid. The microscopic examination revealed gangrene of the intestinal wall with infiltration by acute inflammatory cells. The patient's postoperative course was uneventful, and the reaction immediately following the operation was similar to that seen following appendectomy. The patient was permitted to sit up in a chair on the twelfth day postoperatively, and he was discharged on August 18, in a cured condition.

DISCUSSION

There are several possible etiologic factors to be considered in cases of mesenteric vascular occlusion. The most common is thrombosis of the mesenteric artery or any of its branches, from progressive arteriosclerotic changes similar to that seen in the coronary arteries. Thrombosis of the mesenteric vein may follow puerperal infection, phlebitis, appendicitis, and other

suppurative conditions of the peritoneal cavity. Infected emboli may arise outside the peritoneal cavity, as in the heart, epididymis, and other parts of the body, and end in the mesenteric artery, causing vascular occlusion. Dr. Henry Cave discussed a case in which the patient had endocarditis and developed mesenteric vascular occlusion, and Dr. H. A. Potter has reported a case in a young man 22 years of age, who had acute gonorrheal arthritis with epididymitis, and who had mesenteric occlusion with gangrene of the ascending colon. Dr. Ochsner had described a rarer cause of mesenteric thrombosis associated with prolonged ingestion of alcohol, and recently thrombo-angiitis obliterans has been reported as an important factor by Sneierson.[3] We were unable to demonstrate the etiologic factor in this vascular accident, but we concluded that it was due most probably to arteriosclerotic changes as the patient had moderate generalized arteriosclerosis and no other cause could be found.

The extent and degree of pathologic changes in the intestine and the damage to the circulation is the only means for judging which cases should be left alone or which should have surgical intervention. The color of the intestinal wall is insufficient to determine its viability. If possible we should determine whether or not the blood supply to the lesion has been completely cut off. J. Douglas[4] states that it may be of some assistance to puncture a small vessel in the mesentery close to the intestinal attachment with a needle to see if blood still escapes from the needle prick, and careful observation of the circulation of the mesentery will be a valuable guide to determine the point of resection. It must be recognized that recovery may take place after one-third or even one-half of the intestine has been resected, and the surgeon should not be discouraged if the lesion seems extensive. Meyer states that recovery has occurred after practically complete removal of the small gut. Wolsten reports a recovery after removal of 360 cm., and Sjoval, a successful resection of 450 cm., 90 per cent of the small intestine.

Concurring with Douglas, we feel that the procedure offering the best chance for recovery is one adopting resection and anastomosis where the circulation is impaired beyond any hope of spontaneous recovery. This case is of interest in bearing out the advisibility of this procedure and the short period of hospitalization that it entails. The patient had completely recovered and was walking within fourteen days after 60 cm. of intestine had been resected, with an entirely uneventful postoperative course.

CONCLUSION

A case of mesenteric vascular occlusion is reported. The patient was operated upon within twenty-four hours, sixty centimeters of small intestine being resected, followed by an uneventful postoperative course.

REFERENCES

1. Meyer, W.: Mesenteric Vascular Occlusion. Ann. Surg., **94**:88-96 (July) 1931.
2. Trotter, L. B. C.: Cambridge University Press, 1913.
3. Sneierson, Hyman: Mesenteric Vascular Occlusion. Ann. Surg., **102**: No. 2 (Aug.) 1935.
4. Douglas, John: Mesenteric Vascular Occlusion. Ann. Surg., **102**: No. 4 (Oct.) 1935.

THE IRRITABLE COLON*

By JOSEPH W. LARIMORE, M.D.†
St. Louis, Missouri

The diagnostic conception of the irritable colon is both convenient and useful, yet the definition and description of such a colon are not easy. I have given the diagnosis and received it and am certain that there was as much personal equation as objective meaning in the ideas thus transmitted. Dysfunction of the colon presents as many subjective and objective pictures as there are sufferers, yet there are backgrounds of fundamental similarity which permit of broad classification. By the nature of the confusion this is greatly overlapping.

The unstable or irritable colon cannot be considered as a primary disease entity. This state of the colon is the variable result of factors both intrinsic and extrinsic. The factors are neurogenic, irritative, inflammatory and dietary, and result in mixed secretory and motor disturbances. The implication of a purely functional disturbance from the term "unstable colon" should not exclude the consideration of actual pathologic changes in the mucosa and enteric ganglia. The designation of the colon in this condition as unstable or irritable is justified only because no one factor is so dominant as to admit of a more specific diagnostic appellation indicating a definitive picture.

The possibility of confusion and the difficulty of definite classification is great because

---

*Read in Section on Gastroenterology, Southern Medical Association, Thirty-Third Annual Meeting, Memphis, Tennessee, November 21-24, 1939.

†Associate Professor of Clinical Medicine, Washington University Medical School, St. Louis, Missouri.

of the multiple factors involved. It is pertinent to the problem of definition and classification of colonic dysfunction to consider that the abnormal colon shows either increased or decreased reactivity and that its function is disturbed correspondingly. With decreased reactivity there is diminished tone and peristalsis and exaggeration of the reservoir and absorptive functions with ensuing stasis and constipation. With increased reactivity, with which we are concerned in discussing the irritable colon, there is increased tone and peristalsis with embarrassment or suppression of the reservoir function. The reservoir function is the essential faculty of the bowel for holding without effort the feces or stool until such period of peristalsis as may cause its evacuation. This relatively simple primary classification of colonic reaction is, however, complicated by its segmental distribution and even by the concurrence in different segments of the same or different reactivity. Hypermotility of the proximal segments may be buffered by normal or diminished motility distally, especially where there is redundancy of the sigmoid. Even acute dysenteric states of the anterior bowel may be compensated to normal or constipated total function by this action as may be seen with tuberculous or amebic disease of the right segments, and in the rare right segmental ulcerative colitis gravis which may exist without clinical diarrhea.

The irritable state of the colon in variable degree is characteristic of most infectious and parasitic diseases. In these entities of determinable etiology, attention is directed to that factor and therapeusis is direct, if not easy. The colon does, however, acquire a state of irritability for which no specific etiologic factor is determinable and it is this group of cases, residual after those of specific cause are separated, that may conveniently and usefully be considered under the diagnostic caption of the irritable colon. The clinical symptoms are protean in character and varied in degree, suggesting on the basis of the individual pattern of the anamnesis any of the major gastro-intestinal diseases. Such an equivocal syndrome necessitates exhaustive objective examination for eliminative and positive diagnosis.

The clinical history records irregularity, inadequacy, and uncertainty of defecation; excessive intestinal flatulence; abdominal discomfort or pain with or without distention; diarrheal interludes to normal function or constipation, foul breath and furred tongue, anorexia or dietetic apprehensions, often with much restricted diet. Progressive restriction of diet introduces the problem of deficiency disease and in some cases this may be recognized with much certainty. Pain is accentuated in the late post-digestive period and its recurrence suggests the hunger pain of the duodenal ulcer. The pain and discomfort, often diffuse in the lower abdomen, may, however, center in the right upper or left lower abdominal quadrants and focus attention to regional organs as the seat of disease. The psychic and autonomic nervous reactivity of the patient increases the polymorphism of clinical pictures. Often in stable individuals there is a physical and mental lethargy indicating, along with the halitosis and furred tongue, a noxious absorption. In the neurasthenic, hypochondriacal, and hysterical patients, the primary and secondary symptoms are variously exaggerated. Depression, apprehension concerning inadequate elimination, fear of all or various foods, alarm over unusual stool character and other emotional reactions, including cancerophobia, are superimposed upon the actual colonic disturbance. However, a psychoneurasthenic status is not an essential basis for the diagnosis of the unstable colon. The objective findings in the condition are remediable and these patients are not necessarily condemned to be chronic intestinal invalids.

The physical examination of the patient presents little direct aid to the diagnosis. There is often palpable tenderness of moderate or less degree in the colonic areas. The full cecum may be felt and in spite of succussion if often raises the question of an abnormal tumor. It is tender and the appendix, if present, is brought into the problem. Regional ileitis is suggested. Tenderness over the hepatic flexure suggests cholecystitis.

The objective roentgenologic study becomes the essential in the diagnostic investigation. The colon normally shows a tonicity which is low in the cecum and anterior segments, but increases definitely and considerably distally until it reaches a maximum at the rectosigmoid juncture and here permits an almost sphincteric action. In the irritable colon, tonicity is elevated with lessening of caliber. There is disturbance of the haustrations with increase in their number and they are unequal and asymmetrical. Conduction is disturbed. Over-prompt transit of the anterior segments occurs, probably as much by persisting fluidity of content as by increased peristalsis. The advance of the opaque meal is

much accelerated, often reaching the sigmoid within the normal emptying time of the stomach. The irritability of the anterior colon causes characteristic reactions because of the especial operation of these segments. Their content is normally more fluid and in irritable states this persists unduly. The bacterial flora is active and perverted to excessive putrefaction and fermentation. The catarrhal reaction of the mucosa is evidenced by the foamy or "eaten" margins of the shadow in the opaque enema. The irritability of the musculature is manifested by the relative intolerance to filling, as shown by the rapid transit of the opaque fed meal and by emptiness when normally an opaque residue would be expected. There is a heightened reaction to distention by the cecum and ascendens. The reservoir faculty gives way to intolerance of content. In advanced states there is hypertonicity of the terminal ileum and simple ileitis is indicated. The roentgenologic indications of colonic irritability are certain when developed by the complete gastro-intestinal examination and are clinically significant even when accompanying roentgenologic exhibition of other disease. The elimination of other localized pathological changes in the tract then gives to the demonstration of irritability greater if not primary clinical importance. When the irritability is present in the anterior segments only, the clinical picture has been recognized as intestinal indigestion, cecal dyspepsia, flatulent putrefaction and stercoral typhlitis. Roentgenologically, the term typhlitis serves to indicate the anatomical location of the irritation.

In the distal colon, irritability is accompanied by an excess of mucus, greater impairment of the reservoir function and disturbed conduction embarrassing the usual great movements which characterize the normal peristaltic transit. Bowel action is more frequent and the stool is small and inadequate unless the rectal dysfunction masks this effect. Irritable dysfunction of the distal segments promptly becomes a mucus colitis whether by spontaneous progress or from mistreatment by cathartics and enemas and progresses into a spastic colitis which is usually a mucus colitis. It is rare that one sees the purely neurogenic hypertonic or essentially spastic colon showing lessened caliber with numerous haustrations which are equal and symmetrical and in which conduction and peristalsis remain coordinated. This purely neurogenic colon is transient and associated with fatigue and nervous tension. The status cannot persist long without lumenal irritation supervening with the prompt development of a catarrhal condition and other sequelae. The essentially neurogenic state of the colon is clinically manifested by occasional urgent sudden diarrheal emptying usually some time after a heavy meal, and often at embarrassing times.

The irritable colon and especially its manifestation as catarrhal typhlitis has a manifold importance. It complicates and confuses diagnosis. It often accompanies other surgical disease and remains after its surgical care and by its own nature it is a cause of much morbidity. In the Mallenckrodt Radiological Institute, 24 per cent of all gastro-intestinal x-ray patients have previously had laparotomy and many very recently. Colonic dysfunction of the irritable type is the most common finding and it seems inescapable that this was a complicating if not confusing element in the preoperative diagnoses. Irritability in the colon with diverticulosis favors the development of diverticulitis and correction of the irritation is prophylactic.

Relief of the abdominal complaints of these patients with an irritable colon gives much gratification. There is a general improvement of health by the collateral correction of dietetic deficiency in vitamins and iron, the correction of anemia, often with the lessening of migrainous attacks, and not infrequently, by the relief of allergic phenomena. The promotion of physical and mental well being is often spectacular.

Treatment is dietetic by re-establishment of a balanced menu. Often emphasis on vitamin rich food is indicated. Non-soluble bismuth affords prompt relief of excessive flatus and of pain. It may be continued over a period of months. Its constipating effect may be counteracted by added calcined magnesia, or by oils. Mild sedatives are at times advisable. Physical exercise is of much help.

The conception of the irritable colon is useful. Study of its variations serves to individualize in the care of patients. The roentgenologic demonstration of increased reactivity of the colon, its embarrassed reservoir function, impaired absorption, and disordered conduction in various sites and to different degrees places the diagnosis of the irritable or unstable colon upon an objective basis. Although the necessary exhaustive investigation seems to arrive at an anticlimax the adequate care of this commonplace condition gives relief to serious morbidity.

618 Beaumont Building

TRANSFUSION IN INFANTS*

By JOHN E. BURCH, M.D.
Miami, Florida

In attempting to transfuse an infant with veins of small caliber, it is often difficult to enter a vein and to maintain a needle within the lumen for a sufficient length of time to give 250-300 c. c. of blood.

Some physicians are hesitant in cutting down on veins in order to simplify transfusion. I see no reason for not doing so, as it saves time, permits easy flow of donor's blood without danger of spilling, prevents hematoma formation and does away with unnecessary pain to the recipient.

I routinely use the ankle vein for transfusing infants and almost universally cut down on the vein and insert a blunt needle. This method can be used for either a direct or indirect transfusion. In certain conditions I prefer a direct transfusion as opposed to an indirect one. I particularly like to use whole blood in severe infections, pneumonia, pyelitis and blood dyscrasias associated with changes in coagulation and bleeding time. I think that complement and certain antitoxic and antibacterial substances contained in whole blood are altered by the addition of an anticoagulant such as sodium citrate. If the need for blood is due to anemia from actual blood loss, then I prefer the indirect method.

ROUTES

(1) *Antecubital Space Veins.*—In a well-developed infant with an excess of subcutaneous fat, it is very often impossible to find a vein in this location. In addition it is difficult to hold a child's arm steady long enough to give the required amount of blood even with the aid of an arm board. This route is satisfactorily used in older children who cooperate fully, but you will find that these are among the minority. I have given this route up in routine practice, except in larger children where the vein is distinctly palpable.

(2) *Scalp Veins.*—Very often these veins can be entered easily using a short 25-gauge needle on a side arm extension 2 c. c. syringe. I have given small amounts, 50-100 c. c. (indirect) by this route, but find it very difficult to hold an infant's head still, as it is practically impossible to improvise an apparatus to hold the head in a fixed position. One of my colleagues has devised an ingenious method of entering these veins: he first locates the desired vein, then infiltrates the loose subcutaneous tissue on each side of the vein with physiologic saline, using a 25-gauge hypo needle. The fluid in the subcutaneous tissue acts as a hydrostatic anchor, prevents rolling of the vein, and facilitates easy entrance into the vein lumen.

This route has certain glaring disadvantages:

(1) The head must be held firmly in a fixed position.

(2) It requires more than the average skill to enter and maintain a needle within the lumen of the vein.

(3) It requires a small gauge needle which invites clotting.

(3) *Fontanel Puncture.*—This route has its advocates, but I can see no reason for its use providing other routes are accessible. This procedure is potentially dangerous and should be condemned. It is not technically difficult to enter the venous sinus in the anterior fontanel, but there is great danger of the needle's slipping beyond the sinus wall, causing an extradural hematoma. Likewise, this route tends to increase the intracranial pressure by increasing the intraluminal venous pressure and diminishing the osmotic filtration of cerebrospinal fluid.

(4) *Jugular Vein.*—The external jugular vein should be considered, as it is prominent and palpable in young children. It requires an experienced head holder, because the head and neck must be held firmly in lateral extension. In this manner the sternocleidomastoid muscle is stretched, bringing out the vein prominently and holding it in place. The vein can be entered with a 20-gauge Wassermann needle and small amounts of blood up to 250 c. c. safely given. I do not think this route very favorable if other routes are accessible. The disadvantages of this route are as follows:

(1) The child must be held and maintained in an awkward position which often embarrasses respiration.

(2) There is danger of large hematoma formation.

(3) There is danger of injuring the apical pleura, producing an artificial pneumothorax.

(4) The possibility and potential danger of overloading the right heart due to increased intra-auricular pressure.

*Received for publication May 17, 1940.

(5) *Intercostal Veins.*—Here the caliber of the vein is small as in the scalp vein. A small-gauge needle is required. It is very difficult to locate these veins in well developed infants, but they are prominent in the scrawny, marasmic infant.

(6) *Ankle Veins.*—I consider this route the most accessible and technically less difficult than any of the preceding routes mentioned. I use this route almost routinely and especially where phlebotomy is indicated. I have given over thirty transfusions using this route and have never had any difficulty in locating the vein or giving the blood once the cannula is in the vein.

METHODS

(1) *Direct.*—(A) The Linderman multiple syringe method is one of the oldest in existence, but works splendidly using a trained crew. I see no advantage of this method, but in those institutions where they do not have a direct transfusion apparatus, this method can be used with satisfaction. The set-up consists of four 20 c. c. Luer syringes which have previously been lubricated with sterile mineral oil followed by two washings through physiologic saline. The donor's arm is prepared and trocar inserted; the special rubber connection is attached and tubing clamped with a straight Kelly hemostat. The recipient's vein is then exposed either directly or by cutting down and a similar rubber connection attached. A few c. c. of sterile physiologic saline is injected into the recipient's needle to be sure the needle has been properly inserted and does not leak.

Twenty c. c. of blood is drawn from the donor by operator I, quickly passed to operator II, who injects contents into recipient and passes empty syringe to the sterile nurse, who washes it through two basins of sterile saline and lays the washed syringe on its side on the table in easy reach of operator I. Teamwork is highly important in this procedure and rapidity of passing syringes prevents clotting of blood. The ankle vein may be used in this procedure and I always place the infant on a circumcision board and tie him securely. In this manner the infant cannot move and is made comfortable. This step also does away with an additional assistant.

(B) *Scannell Apparatus.*—Various machines for direct transfusion are on the market today and each is a masterpiece of mechanical ingenuity. I am not endorsing any certain machine, but I have become accustomed to the use of the Scannell apparatus and have used it in all of my cases with success and without difficulty. These various direct machines, although almost mechanically perfect, nevertheless are not foolproof, and you will find that they occasionally leak air due to faulty adjustment and blood will clot in the barrel of the syringe; this latter catastrophe is not the fault of the machine, however, but of the operator. I wish to point out one important fact that is often lightly regarded in giving blood by direct method. Where there is a three-way stopcock intervening in the circuit, there is a potential danger of air embolism and therefore the operator giving the transfusion should be careful not to introduce air mixed with blood into the recipient. This grave danger is not to be considered lightly or scoffed at, as it enters into any form of intravenous therapy.

On using the Scannell apparatus, I first place the infant (recipient) on a circumcision board. The thighs and abdomen are secured to the board with folded lap towels and held in place with safety pins. The legs are further secured to the board with gauze bandages applied about the middle of the leg to just above the ankle. This holds the mesial surface of the ankle uppermost. A pillow is then placed under the child's head and back, making him as comfortable as possible. The ankle is then prepared with iodine and alcohol and sterile drapes are arranged. A small area just above the medial malleolus (about ¼ inch) above its upper margin is infiltrated with 1 per cent procaine hydrochloride solution, then a small transverse incision (½ inch) long is made with a scalpel and gently carried down to the subcutaneous tissue. Then, using a straight (mosquito) hemostat, the vein is isolated from other structures by gentle blunt dissection. A full curved round needle threaded with No. 00 plain catgut is then introduced under the vein backwards, looped and cut and the upper suture tied loosely in a surgical knot and clamped to the towel with a hemostat. The lower loop of the suture is caught at the ends with a hemostat and allowed to hang over the ankle, acting as a hemostatic loop. Holding the vein taut a small niche is made in the vein wall with scissors and then the blunt 18-gauge needle is introduced almost to the hub; then the loose knot is tightened over the needle, using only a single knot to facilitate removal later. A trocar is then inserted into the donor's vein and the apparatus connected. I first introduce 10 c. c. of saline into the recipient slowly to make certain there is no leak or clotting, then holding the plunger

of the syringe depressed, I draw 10 c. c. of the donor's blood and introduce it into the recipient's circuit. I never pull more than 10 c. c. at a time as larger amounts will cut down speed and favor clotting and also have a tendency to draw air ahead of the blood. If air is ahead of the blood column, I immediately switch to saline and force all air out and then switch to the recipient. After I have given about 100 c. c. of blood, I usually introduce about 15 c. c. of saline and begin as before. At the completion of the transfusion the sutures are removed, needle withdrawn from the vein and a sterile pressure bandage applied. I never ligate a vein or suture the resultant skin wound; and in all my cases I have never had a phlebitis, embolism or wound infection. In addition, I have gone back to the same vein two months later after the skin incision had healed and found the lumen of the vein patent. I think this last step represents a departure from the usual method.

THE ROLE OF VITAMIN K IN THE ETIOLOGY, PREVENTION AND TREATMENT OF HYPOPROTHROMBINEMIA AND THE HEMORRHAGIC DIATHESIS OF THE NEWLY BORN*

By W. W. Waddell, Jr., M.D.
DuPont Guerry III, M.D.
and
McLemore Birdsong, M.D.
University, Virginia

In recent articles [1] [2] [3] the writers have described the unusual prothrombin deficiency occurring with surprising frequency in the first week of life, and the prompt and efficient manner in which vitamin K concentrate administered to the infant by mouth prevented and corrected any existing prothrombin deficiency. Six cases of unnatural bleeding associated with hypoprothrombinemia, prolonged clotting time and unnatural bleeding were recorded. In every instance administration of vitamin K concentrate by mouth controlled all bleeding in from two to three hours. The clotting time of the blood and the prothrombin time promptly fell to within normal limits. These findings suggested a direct relationship between prothrombin deficiency and hemorrhagic disease of the newly born. The suggestion was made that prothrombin deficiency is the immediate cause of bleeding in the hemorrhagic diathesis of the newly born and that hypoprothrombinemia is in turn associated with vitamin K deficiency.

The purpose of this report is to record additional evidence in support of these suggestions. The data here described confirm in every detail the writers' original findings and impressions.

As in our previous reports the prothrombin determinations recorded were done after the Bray and Kelly[4] modification of Quick's method for determining the prothrombin content of the blood. This method has proven a reliable index of the prothrombin content of the infant's blood, and since it permits the use of capillary blood obtained by heel puncture, has made possible prothrombin determinations on a rather large scale. All clotting times were done by the capillary tube method and by the same individual.

Chart 1 describes the prothrombin times in 25 K-treated infants and 25 concurrent controls. Four prothrombin determinations were made on the blood of each infant and the figure records the highest prothrombin time noted in each infant, and the day on which it occurred. The prothrombin times are shown in seconds after the modified method of Quick. Each treated infant received vitamin K concentrate* in the following fashion: 600 units by mouth on admission to the nursery, 600 units at the end of twenty-four hours and 600 units at the end of forty-eight hours. The solid blocks represent the treated cases and the checkered blocks the control cases.

The frequency with which prothrombin deficiency occurred in the control cases is apparent, while no deficiency is noted in the K-treated cases. Prothrombin deficiency in the control series was most frequently observed on the second and third day and was not observed after the fifth day. These findings are identical with those described in our preliminary report.

Chart 2 describes the clotting time of the blood in this same series of cases. The solid blocks represent the treated cases and the checkered blocks the control cases. It will be seen that as

---

*Received for publication January 10, 1940.

*From the Department of Pediatrics, University of Virginia Department of Medicine.

*On the studies presented in this paper, together with previous work on the same subject, the John Horsley Memorial Prize of the University of Virginia for the year 1940 was awarded to Dr. DuPont Guerry III.

*The natural vitamin K concentrate employed in these studies was made available through Abbott Laboratories.

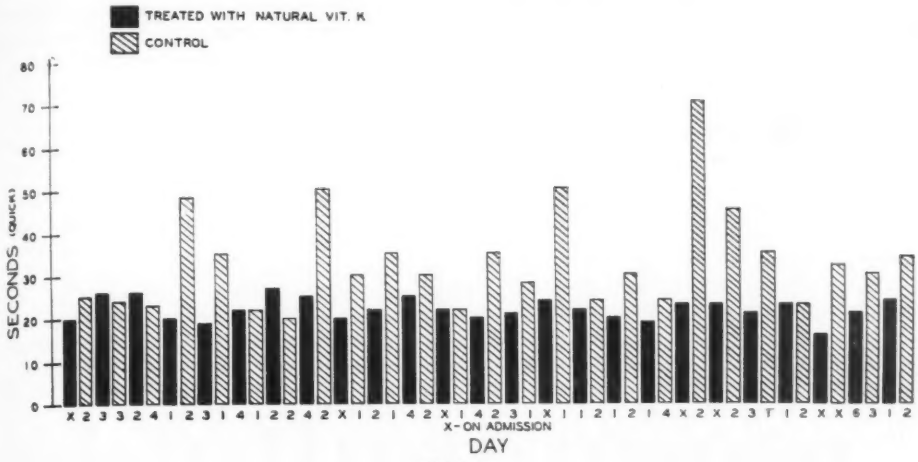


Chart 1
Prothrombin time.

the prothrombin time rises or falls so does the clotting time of the blood. The longer clotting times of the control cases is apparently the direct result of prothrombin deficiency.

Chart 3 describes the prothrombin times in 24 K-treated infants and 24 controls. Four prothrombin determinations were made on the blood of each infant and the figure records the highest prothrombin time noted in each infant, and the day on which it occurred. The prothrombin times are shown in seconds after the modified method of Quick. In this series each treated infant received synthetic vitamin K (2-methyl-1, 4 naptho quinone)* in the following fashion: 1,000 units on admission to the nursery, 1,000 units at the end of twenty-four hours, and 1,000 units at the end of forty-eight hours. The solid blocks represent the treated cases and the checkered blocks the control cases.

The findings are identical with those observed

*The synthetic vitamin K was kindly furnished by E. R. Squibb & Sons.

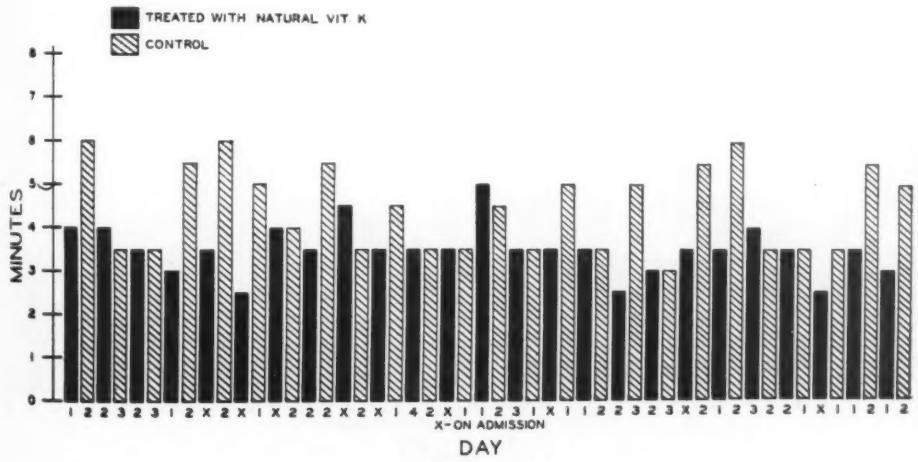


Chart 2
Clotting time.

in the series treated with natural vitamin K concentrate. Prothrombin deficiency occurred with regular frequency in the control series. No prothrombin deficiency occurred in the treated series. Natural vitamin K concentrate and synthetic vitamin K appear to be equally effective in the prevention of hypoprothrombinemia of the newly born.

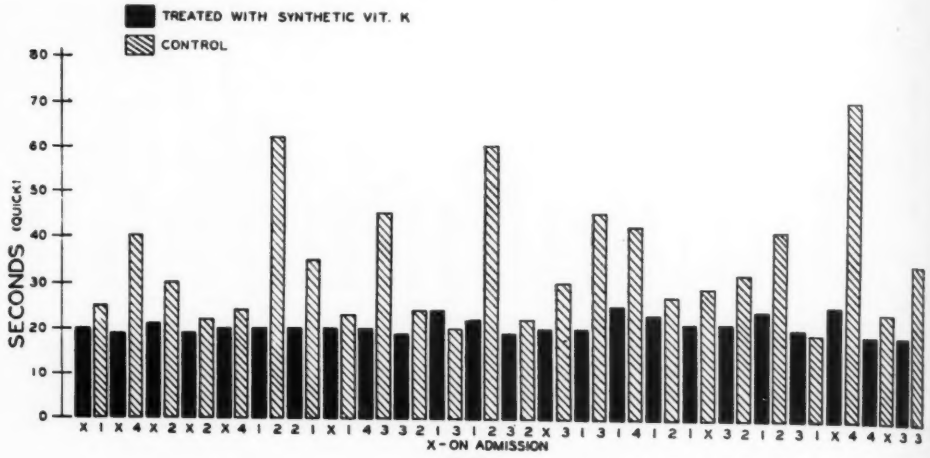

TREATED WITH SYNTHETIC VIT. K
CONTROL
SECONDS (QUICK)
80
70
60
50
40
30
20
10
0
X 1 X 4 X 2 X 2 X 4 1 2 2 1 X 1 4 3 3 2 1 3 1 2 3 2 X 3 1 3 1 4 1 2 1 X 3 2 1 2 3 1 X 4 4 X 3 3
X-ON ADMISSION
DAY

Chart 3
Prothrombin time.

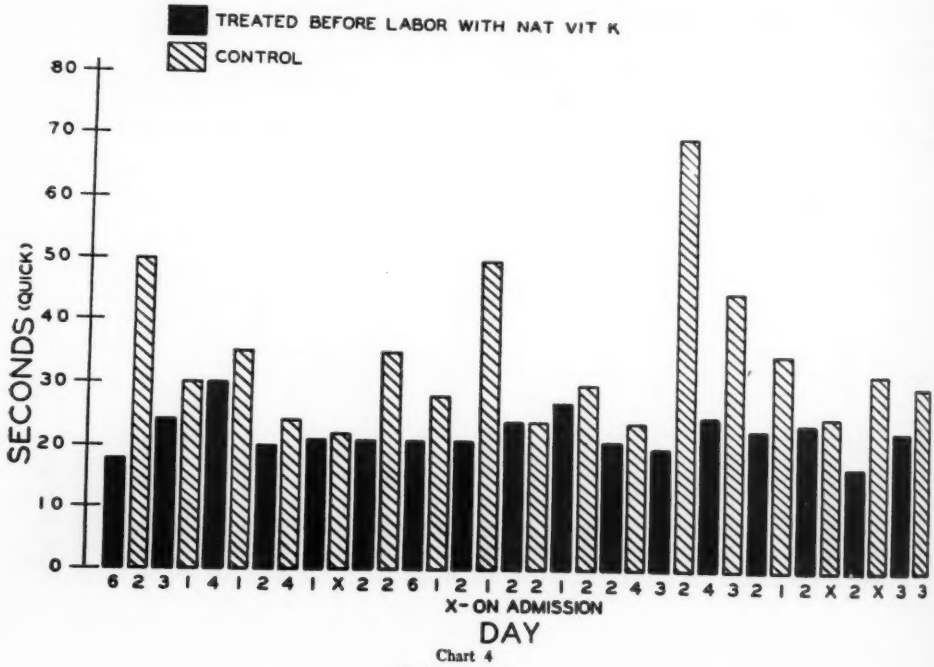


Chart 4
Prothrombin time.

As the prothrombin time rises and falls so does the clotting time. The solid blocks represent the treated cases and the checkered blocks the controls.

Believing that varying degrees of prothrombin deficiency do exist at the time of birth, and may materially predispose to intracranial hemorrhage associated with normal labor, we have attempted to prevent prothrombin deficiency in the infant by administration of vitamin K to the mother in the last few weeks of pregnancy. In an earlier report we described a small series of cases in which hypoprothrombinemia in the infant was apparently successfully prevented in this fashion. In the following two series of cases additional data are presented which demonstrate that prothrombin deficiency and the associated prolonged clotting time of the blood can be efficiently prevented by administration of vitamin K in this fashion.

Chart 4 describes the prothrombin times in 17 infants to whose mothers natural vitamin K concentrate was administered in the last weeks of pregnancy in the following fashion: 3,750 units daily for two weeks, and a maintenance dose of 1,200 units daily until delivery. The findings in these infants are compared with those of a similar number of nursery neighbors whose mothers were not K-treated. Four prothrombin determinations were made on the blood of each infant, and the figure records the highest prothrombin time noted in each infant and the day on which it occurred. The solid blocks represent the treated cases and the checkered blocks the control cases. In the control cases the prothrombin deficiency in certain cases is apparent. In the infants K-treated through the mother, prothrombin deficiency was efficiently prevented.

The clotting time keeps pace with the prothrombin time. The clotting times of the infants born of treated mothers remained at a safe and low level.

Chart 5 describes the findings in an additional series of 17 infants K-treated through their mothers, and a similar group of nursery neighbors whose mothers were not K-treated. In this series the mothers were given by mouth 2,000 units of synthetic vitamin K daily in the last two weeks of pregnancy or until deliv-

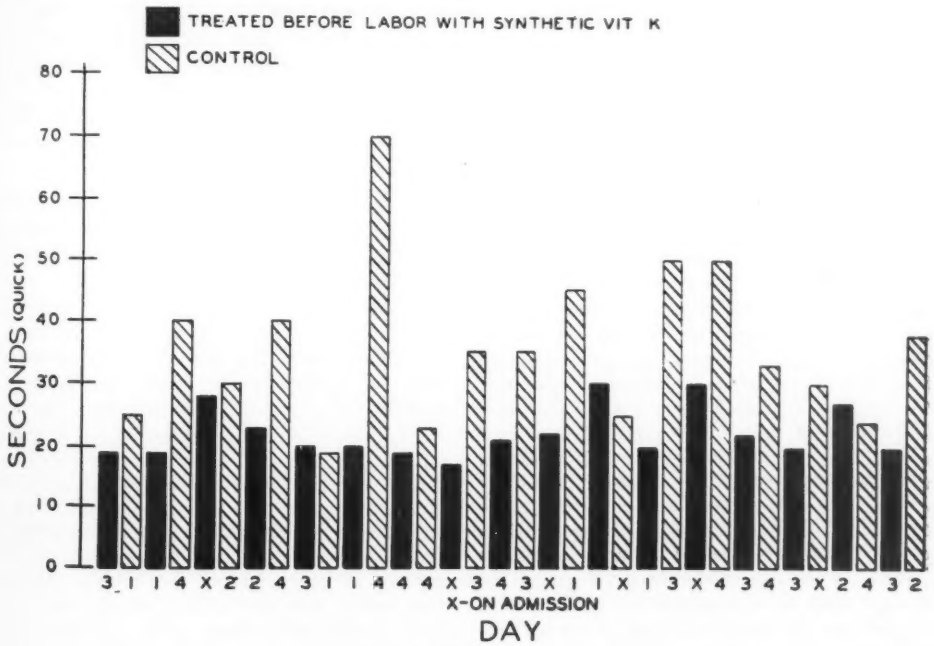


Chart 5
Prothrombin time.

ery. Four prothrombin determinations were made on the blood of each infant and the figure records the highest prothrombin time noted and the day on which it occurred. The solid blocks represent the treated cases and the checkered blocks the control cases. In this series also not a single instance of prothrombin deficiency was observed in those infants K-treated through the mother. This fact is again contrasted with the control group.

The clotting time in general keeps pace with the prothrombin time. Synthetic K appears to be equally effective with natural K concentrate in the prevention of hypoprothrombinemia in the newly born.

Studies at present being carried on by the writers indicate that vitamin K administered intravenously to the mother after the onset of labor will prove equally effective in the prevention of hypoprothrombinemia of the newly born. These data will be recorded at a later date. This method of approach should prove of great convenience and the cost of materials negligible.

DISCUSSION

Other investigators working along identical lines have reported similar findings and similar results. Hellman *et al.*[5 6] have reported prothrombin deficiency in newly born infants with a frequency comparable with that observed in our series. They have successfully prevented hypoprothrombinemia by administration of vitamin K to the infant and to the mother before delivery. They have been able materially to raise the prothrombin content of the blood of pregnant mothers in this manner. Their series suggests that prothrombin deficiency is particularly common in premature infants. We have studied the blood in a series of 24 premature infants and have observed hypoprothrombinemia with even less frequency than that of full-term infants. These same investigators have not demonstrated the second and third day drop in prothrombin content of the blood described by us. This has always been and continues to be a constant finding in our series of cases. Dam *et al.*[7] state that in normal infants an avitaminosis K which is usually moderate develops in the first days after birth, disappearing after a week. The presence of jaundice seems to be without significance. In some cases of icterus gravis, anemia of the newly born and congenital dropsy, hypoprothrombinemia was observed. This we suspect was perhaps a coincident finding in these conditions. Nygaard,[8] also using the Quick method for determining prothrombin deficiency, reports findings during the first week of life identical with those described by the writers. These studies indicate that a normal prothrombin time is maintained during the first ten hours of life, and that a definite reduction occurs during the second half of the first day. He believes that hemorrhages of the newly born generally occur when the degree of prothrombin deficiency exceeds that present at birth. He administered with gratifying results vitamin K to three infants suffering from hemorrhage associated with hypoprothrombinemia. It is our belief and experience that prothrombin deficiency is at times actually present at birth. We have found prothrombin deficiency in cord blood on two occasions. This is also in accordance with the findings of Brinkhous *et al.*[9] It should also be remembered that lesser degrees of prothrombin deficiency cannot be detected successfully by the Quick method. Even lesser degrees of prothrombin deficiency aided by birth trauma may perhaps result in serious hemorrhage.

Within the last year sufficient data have been recorded to make it appear unlikely that hemorrhagic disease of the newly born is not a matter of hypoprothrombinemia. It seems also likely that spontaneous hemorrhage will not occur in any infant adequately treated with vitamin K.

It is unreasonable to believe that sudden massive hemorrhages associated with labor and delivery can be materially influenced by vitamin K administered through the mother. In the light of present knowledge and recently reported studies it seems probable, however, that petechial hemorrhages slow and oozing in nature may be materially prevented by vitamin K therapy. There seems no doubt that such hemorrhages do occur, and perhaps with a frequency far greater than is now commonly believed. Perhaps a very considerable number of infants surviving intracranial hemorrhage occurring at the time of delivery may belong in this category. Certainly signs of intracranial hemorrhage frequently are not apparent until hours, or even days, after delivery. This strongly suggests a slow oozing hemorrhage. Too few data have been recorded to yet predict what can be expected from vitamin K therapy in cases of this

nature. The chance of very material success would seem rather more than hopeful.

SUMMARY

(1) In 83 newly born infants serving as control cases prothrombin deficiency was observed with surprising frequency.

(2) In 25 infants hypoprothrombinemia was efficiently prevented by oral administration of natural vitamin K concentrate to the infant in the first few days of life.

(3) In 24 infants hypoprothrombinemia was efficiently prevented by oral administration of synthetic vitamin K to the infant in the first few days of life.

(4) In 17 infants hypoprothrombinemia in the infant was efficiently prevented by administration of natural vitamin K concentrate to the mother in the last two weeks of pregnancy.

(5) In 17 infants hypoprothrombinemia in the infant was efficiently prevented by administration of synthetic vitamin K to the mother in the last two weeks of pregnancy.

(6) The suggestion is again made that prothrombin deficiency is the immediate cause of the hemorrhagic diathesis of the newly born and that hypoprothrombinemia will not occur in infants adequately treated with vitamin K.

(7) The possible relationship of prothrombin deficiency to intracranial hemorrhage associated with labor and delivery is further discussed.

BIBLIOGRAPHY

1. Waddell, W. W., Jr.; and Guerry, D. III: Effect of Vitamin K on the Clotting Time of the Prothrombin and the Blood. J.A.M.A., **112**:2259-2263 (June) 1939.
2. Waddell, W. W., Jr.; Guerry, D. III; Bray, W. E.; and Kelly, O. R.: Possible Effects of Vitamin K on Prothrombin Time and Clotting Time in Newly Born Infants. Proc. Soc. Exp. Biol. & Med., **40**:432 (March) 1939.
3. Waddell, W. W., Jr.; and Guerry, D. III: The Role of Vitamin K in the Etiology, Prevention and Treatment of Hemorrhage in the Newly Born. Jour. Pediat., **15**:802 (Dec.) 1939.
4. Bray, W. E.; and Kelly, O. R.: Prothrombin Studies, Especially in the New Born. Amer. Jour. Clin. Path. To be published.
5. Hellman, L. H.; and Shettles, L. B.: Factors Influencing Plasma Prothrombin in the New Born Infant. I. Prematurity and Vitamin K. Bulletin of the Johns Hopkins Hospital, **65**: 138 (July) 1939.
6. Shettles, Delfs; and Hellman: 1. Factor Influencing Plasma Prothrombin in the New Born Infant. 2. Antepartum and Postpartum Ingestion of Vitamin K Concentrate. **65**: 419 (Nov.) 1939.
7. Dam, H.; Tage-Hansen, E.; and Plum, P.: Avitaminosis K in Infants as Cause of Hemorrhagic Diathesis. Ugeskrift for Laeger, Copenhagen, **101**:896 (Aug.) 1939.
8. Nygaard, K. K.: Prophylactic and Curative Effect of Vitamin K in Hemorrhagic Disease of the New Born (Hypoprothrombinemia Haemorrhagica Neonatorum): Acta Obstet. et Gynec. Scandinavia, Stockholm, **19**:361 (No. 3) 1939.
9. Brinkhous, K. M.; Smith, H. P.; and Warner, E. D.: Plasma Prothrombin Level in Normal Infancy and in Hemorrhagic Disease of the New Born. Amer. Jour. Med. Sci., **193**:475 (April) 1939.

VAGINAL DISCHARGE DURING PREGNANCY*

By A. P. HUDGINS, M.D.
Charleston, West Virginia

Vaginal discharge during pregnancy is a problem because of: (1) inconvenience to the patient; (2) the psychic factor; (3) the accompanying irritation; (4) it is an important guide to the underlying disease.

In trying to obtain a satisfactory history of a case which is presumably leukorrhea, repeated and persistent questioning is required. Some women say they have a discharge when, in reality, they merely assume there is discharge because an irritation is present about the vulva. These cases should be called pruritus, of course, rather than leukorrhea. Often though not invariably, discharge is present, but the chief complaint is pruritus. Certain patients complain of discharge and on examination none is found, even though no douche preceded the examination. Not infrequently, it is found on repeated questioning that the clothing is never stained or soiled, but the patient repeatedly finds moisture which she thinks is abnormal and constant douching does not relieve it. This is especially true during pregnancy. A simple explanation as to the physiology will relieve her mental anguish and if examination is negative, over-douching should be stopped.

Leukorrhea, or vaginal discharge, is the most frequent gynecologic complaint for which relief is sought. It must be considered significant unless proven otherwise, and any pathology is doubly important when complicating gestation.

Leukorrhea is a whitish, viscid discharge from the vagina or uterine cavity. It is broadly used to include any vaginal discharge other than blood.

In making a study of a vaginal discharge, there are a number of facts to be ascertained:

(1) Whether the onset is sudden or gradual, and with what it was associated, for example: following miscarriage or delivery, accompanied by abnormal pain, whether menses have varied since discharge started; the possibility of venereal infection; whether it was present before pregnancy.

---

*Read in Section on Obstetrics, Southern Medical Association, Thirty-Third Annual Meeting, Memphis, Tennessee, November 21-24, 1939.

(2) Color, white, yellow, greenish, blood tinged, whether the color has varied or not.

(3) Consistency thin, watery, thick, foamy, bubbly.

(4) Amount profuse or scant. If variable, to what the increase is associated or attributed.

(5) Odor, if foul, whether slight or marked.

(6) Cutaneous irritation, whether there is chafing or itching associated with discharge.

(7) Treatment received and results noted.

The causes of leukorrhea may be divided into two broad groups: (1) physiologic and (2) pathologic.

Physiologic.—It is a well-known fact expounded by Karnaky[13] and others that the vaginal mucosa becomes thicker with an accompanying hypersecretion during pregnancy. This may give some concern, especially to those who are already willing or anxious to suspect trouble in pregnancy. Care in explaining this will be greatly appreciated by the patient and the physician will be rewarded by allaying nervous tension in the woman.

The pathologic group of causes is subdivided into two broad groups: (1) local conditions, and (2) constitutional factors.

(1) Local conditions to show the possible wide range of causes
- (A) Infections
  - (a) Venereal
    - (1) Gonococcus
    - (2) Bacillus of Ducrey
    - (3) Organism of lymphogranuloma venereum
    - (4) Vincent's infection of the genitalia
    - (5) Spirocheta pallida
  - (b) Pyogenic
    - (1) Staphylococcus
    - (2) Streptococcus
    - (3) *B. coli*
    - (4) Pneumococci
    - (5) Catarrhalis
  - (c) Protozoal
    - (1) Trichomonas
    - (2) Ameba urogenitalis
  - (d) Yeast-like fungi
    - (1) Monilia
  - (e) Verminal
    - (1) Oxyuris
    - (2) Ascaris
    - (3) Echinococcus
    - (4) Filaria bancrofti
  - (f) Miscellaneous (rarer)
    - (1) Tubercle bacillus
    - (2) Diphtheria
    - (3) *B. tetani*
    - (4) *B. typhosus*
    - (5) *B. aerogenes capsulatus*
- (B) Chemical or irritant
  - (1) Over-douching
  - (2) Too strong solution or improper
- (C) Anatomical or structural abnormalities
  - (a) Uterine displacement
  - (b) Subinvolution
  - (c) New growths
    - (1) Benign (polyps, etc.)
    - (2) Malignant
  - (d) Foreign bodies
  - (e) Cervical ulceration
  - (f) Fistula

(2) Constitutional factors
- (A) Anemia
  - (a) Chlorosis or pernicious
- (B) Endocrine disturbances
- (C) Debilitating diseases
- (D) Constipation
- (E) Circulatory or hepatic disease
- (F) Avitaminosis

Curtis has given the causes of leukorrhea in order of importance:

Gonococcus
Bacillus coli communis
Streptococcus
Staphylococcus
Tubercle bacillus

In recent years, the increased interest in Trichomonas vaginalis and the improved methods for studying this organism have placed it as one of the chief offenders. It is reported by some to be as high as 37 (Karnaky) to 50 per cent. Monilia albicans has been found by recent methods of study also to be an important cause of leukorrhea during pregnancy. The leaders, then, in the cause of leukorrhea are certainly Trichomonas, gonococcus and yeast.

Much has been written recently about the physiology of the vaginal tract during pregnancy, infection, the menstrual cycle and menopause, especially the glycogen content of the cells, the hydrogen ion concentration (pH) of the vaginal secretions, the normal flora of the vagina, and the number of Döderlein bacilli present.

Of special interest is the hydrogen ion content which is conveniently expressed in the pH readings. This test can quite easily be made by the use of nitrazine paper and the color chart prepared for reading the test. This is not a difficult procedure and gives valuable additional information during the examination.

DIAGNOSIS

Gonorrhea must be considered in every case of discharge and carefully ruled out by repeated smears and cultures if necessary. Gonorrhea has been reported to be the most widespread of infectious diseases. More than just a simple smear should be used to determine whether the symptoms are due to the gonococcus. Repeated

smears should be made of the cervix and urethra after the use of silver nitrate to the cervix to liberate latent organisms. The patient should be examined for stigmata of gonorrhea: Skene's glands, Bartholine's glands, adnexal disease or a suspicious history. De Lee has said that the patient is more susceptible to Neisserian infection during pregnancy due to the succulence of the tissues.

Trichomonas vaginalis as a causative agent has been considered the sole factor in the majority of vaginal discharges, and also has been exonerated because it is widely distributed and is found in women who have no symptoms at all. Some believe that its discovery is an incidental finding, the real pathogenic factor being an associated or auxiliary organism.

Bland and others report the presence of this organism in 20 per cent of all pregnant women examined. Bland suggests that it may be harbored regularly, with clinical manifestations only during pregnancy. This investigator also suggests that puerperal morbidity may result from this organism at times. Glassman[9] reports the finding of Trichomonas in 10 to 40 per cent of pregnancies, in 50 to 70 per cent of all cases with leukorrhea, and reports that it is more frequently found during pregnancy. Of 309 pregnant patients examined, 20.7 per cent (79 cases) of white patients and 45 per cent (57 cases) of negroes were found to have Trichomonas. Often complaints from this source clear up spontaneously after delivery. Bland, Goldstein and Wenrich[1] reported on the study of 300 gravid women, with Trichomonas in 21 per cent; colored, 32 per cent, white, 9.5 per cent. It is interesting to note that only 13 per cent of these patients had symptoms.

The controversy over the pathogenesis of the Trichomonas is well known. Streit[18] examined 253 women, 21 of whom had gonorrhea, and found Trichomonas vaginalis in 83 (32.8 per cent). Thirty-two per cent of the 131 pregnant patients also had this organism, the examination being made in the last month of pregnancy. In 41 women with gonorrhea, Trichomonas was found in 23 (56 per cent). This investigator concludes that Trichomonas vaginalis is not the causative agent of symptoms; that it is a saprophite; that the pathologic findings are produced by other organisms. (I know this statement will be contested today.)

The signs and symptoms of infection reported to be due to the Trichomonas are: discharge, which is yellowish, foamy and irritating; with at times a strawberry-like vaginal mucosa.

It seems a fair question: is the presence of Trichomonas harmful to the patient if there are no symptoms? No physician would neglect the Neisserian organism, even though no symptoms were presented by the patient. Should we diligently seek out Trichomonas as we do the gonococcus or wait for it to come to us?

It has been stated (Glassman) that Trichomonas symptoms may subside after a delivery and recur only at the next pregnancy. Buxton and Shelanshi[2] found pain in the lower quadrants which they attributed to the Trichomonas. Rodecurt's[17] studies of cultures from Trichomonas led him to the conclusion that this organism may cause pelvic adhesions.

Some observers consider Trichomonas only as important as its chief symptoms: discharge and irritation. If this is true, the approach should be symptomatic, in marked contradistinction to our attitude toward gonorrhea. Certainly, methods which in themselves are potentially dangerous should be avoided during pregnancy in an attempt to correct a condition which is, perhaps, only as important as its annoying symptoms.

Fungus infections of the vulva and vagina have been recognized for many decades under various names: colpitis mycotica acuta; vaginal moniliasis; apthous vaginitis; mycotic vulvovaginitis; mycotic vaginitis; vaginal or cervical thrush; vulvitis aphthosa; mycosis vaginae; mycosis vaginalis; saccharomycotic vulvovaginitis; and muguet vulvovaginale.

Among modern authors of textbooks, the majority, Kerr,[14] Fulkerson,[8] Crossen,[5] Graves[10] and Frank[7] assume the pathogenicity of the fungus, but say that mycotic vaginitis is rare and usually mild. In the current literature, Le Blaye, Moench,[15] Davis,[6] Heard, Popoff, Ford and Cadmus, Odland and Hoffstadt, Flusser, Perazzi and Cordey, in reporting their experiences, assume the same relationship. On the other hand, Castellani[3] and Taylor and Castellani[4] express some doubt, since the organism may be present in the vagina without producing symptoms. Finally, Stephen, supporting Zweifel's contention of the nonpathogenicity of the fungus, feels that the organism is not the chief etiologic factor in the inflammations with which it is associated, but that by excoriating the mucosa it permits the entrance of other micro-organisms present in the

profuse, mixed vaginal flow, and that these latter produce the inflammatory reaction.

Haussmann[11] found the fungi in 11 per cent of pregnant women who were without symptoms of vaginal irritation, and Moench says:

"Yeast cells are occasionally encountered in cultures from the normal cervix."

Symptoms and Signs.—V. Winckel[19] insisted that itching is the only common symptom, even though burning, especially after urination, smarting, pelvic fullness, and vaginal sensitiveness are frequently noted. Digital and speculum examinations and coitus may be extremely painful. All systems tend to be aggravated at night. Remissions are common and, in pregnant women, delivery usually brings relief from symptoms. Among nonpregnant individuals, the symptoms are usually worse in the premenstrual period, when the vaginal acidity is increased, in contrast to infections with Trichomonas vaginalis, in which discomfort is more pronounced during or just after menstruation (Davis). Following an acute infection, the organisms may remain in the vagina for years without producing symptoms, or with occasional exacerbations followed by spontaneous relief.

The infection may, or may not, lead to the development of thrush-like patches on the vaginal, vulval or cervical epithelium. When such localized growths are present, the lesion may resemble vaginal diphtheria, or may be similar to oral thrush. In other instances, and they are in a great majority, intense reddening of the mucosa of the labia minor, the intritus and vagina (particularly the lower third) occurs, with occasionally the development of a granular appearance suggestive of acute gonorrheal vaginitis. The irritation may involve the perineal skin and lead to the development of local intertrigo. Rarely have furunculosis and ulceration been recorded. Local edema may be present in severe cases, and condylomas, resulting from the chronic irritation, have been noted (Moench).

Vaginitis in pregnant women is more frequently associated with Monilia infection than is vaginal irritation in the nonpregnant.

That the actual presence of dextrose in the urine is a determining factor in the growth of the organisms and in the development of symptoms in diabetic individuals is suggested by the experience of Perazzi, who treated a diabetic with insulin and dietary management and noted relief of the vaginitis without the aid of local applications. It would seem very probable that, in patients with so-called diabetic pruritus vulvae, the irritation may be due to the presence and growth of Monilia with the resulting increased vaginal acidity, rather than to chemical action of the glucose itself, as has been usually thought. Vaginal discharge is perhaps more frequent during pregnancy compl cated by diabetes.

Monilia vaginitis in pregnant women is a definite source of infection in sporadic outbreaks of oral thrush in the newborn.

The bacteriologic diagnosis of mycosis is not always easy. The work of Jones and Martin[12] points to the fact that cultural methods of some detail are required to find many of the yeast-like growths.

TREATMENT

Gonorrhea.—The warning to be gentle and not to overtreat is more applicable to gonorrhea during pregnancy than at other times. Before the advent of sulfanilamide rest and symptomatic and systemic treatment were all that was advised. The use of local heat except by the Elliott method is limited.

In recent years, sulfanilamide has changed the treatment somewhat. The American Neisserian Society,[16] in a report (in September, 1938) advised against the use of sulfanilamide during pregnancy or immediately after delivery.

In the writer's clinic, sulfanilamide has been used orally, in the usual doses, without any untoward effects in treating gonorrhea complicating pregnancy.

Recently, better results have apparently been obtained by augmenting the oral treatment with local application of powdered sulfanilamide with a small, soft tampon which is retained several days, no douches being used, of course. Symptomatic relief is gratefully noted by the patient, and the course of the disease is also apparently shortened. A report of this work will be made later.

This work was begun through a misunderstanding. Local sulfanilamide has not previously been reported to be useful. Whether the retained tampon, which also is not looked upon with favor, is a helpful factor remains to be seen.

The retained tampon should be helpful, if the theory is correct that the body prevents a generalized Neisserian infection by infection of the tubes. A pyosalpinx progresses to a hydrosalpinx, and the retained action of the antibodies formed during bacterial growth, which is self-

limited, destroys itself by its own antibody activity.

Another type of gonorrhea may be helped by sulfanilamide. It has been the writer's experience that a regular course of sulfanilamide is beneficial when there is a marked leukorrhea with stigmata of old gonorrhea, even though no bacteriologic proof of infection can be established at the time of examination. At least a trial is justified.

Local use of sulfanilamide is very helpful in clearing up the after-discharge, when the smears return negative. For this reason, the writer uses sulfanilamide locally in all cases of gonorrhea, especially in pregnancy.

This means, then, that sulfanilamide orally and locally is advised during pregnancy, not only for bacteriologically proven cases, but also in doubtful cases of "cured" gonorrhea, with continued discharge, and in suspicious cases justified by stigmata, physical findings or history.

TREATMENT OF TRICHOMONAS

The treatments recommended for Trichomonas vaginitis are legion, ranging from vinegar douches to many expensive suppository preparations. No one has apparently been universally accepted. Perhaps it will be well to list a few:

(1) Vinegar douche (or acetic acid douche) using 3 tablespoons of household vinegar to 2 quarts of water once or twice a day.

(2) Twenty-five per cent sodium chloride douche. The warning here should be to be sure to use coarse barrel (or ice cream) salt, not table salt, as this will irritate. The writer has found it worth-while to go into detail, showing the patient glass tumblers: one glass of salt to 3 glasses of water.

(3) Bichloride of mercury (1:4000) douche.

(4) Cleansing of vagina (in office) with:

(a) Green soap

(b) Cotton mops followed by hot air drying

(5) Lassar's paste (sodium salicylate gr. X, starch gr. XL, zinc oxide drams 1) tampons.

(6) Picric acid powder and suppositories.

(7) Merthiolate suppositories.

(8) Suppositories containing an arsenic acid compound.

(9) Carbarsone.

(10) A Streptococcus vaccine and filtrate.

(11) Aldarsone.

(12) Lactose tablets.

One thing is important: to continue the treatment over a period of time, and during menstruation, when the patient is not pregnant.

TREATMENT OF MONILIA

Treatment of monilia is not always satisfactory. One per cent gentian violet is at times almost a specific. Someone has recommended 5 per cent gentian violet in 50 to 70 per cent alcohol. This may be quite irritating and require an anesthesia, or if it is very painful it will perhaps prevent the patient's returning for further treatment.

Other methods of treatment are:

(1) Alkaline douches.

(2) Lugol's, ½ to ¼ strength, or ¼ to 1/5 strength iodine in aqueous solution has been suggested.

(3) Sodium borate, one dram to one ounce glycerine as suppositories, to be left in 24 hours daily for three days (Cornell).

The writer's attitude in approaching a case of leukorrhea during pregnancy is: first, what serious conditions are present to be corrected, or what may develop as a result of the activity of the pathologic agent causing this symptom? Second, how can this patient be effectively and safely relieved from this aggravating symptom?

Approaching the problem from this angle, certainly gonorrhea, whether bacteriologically demonstrable or not, must be considered and ruled out, even if the therapeutic test is necessary. Adnexal disease is difficult to diagnose after the first few months of pregnancy. The cervix looks eroded in a large number of pregnancies. These conditions limit the clinical diagnosis or suspicious approach to a possible diagnosis of gonorrhea during pregnancy.

Another serious condition which may be present is marked ulceration of the cervix. Active treatment in any drastic form is contraindicated during pregnancy.

The writer's aim in treating, after ruling out the possibility of serious complications, is the humble clinical result of having the patient satisfied and relieved from this disturbing symptom.

Many of the reports on leukorrhea have been dependent on the microscopic or bacteriologic proof of the cure for a disease which is symptomatic only, with no evidence of further harm than an aggravating symptom.

In my small clinic, funds were not available for expenditures for the expensive commercial products and so a simple, economical method was sought.

In 1930, the writer reported the use of acetyl salicylic acid powder in the treatment of fungus

infections of the genitalia and thigh (often called "jockey strap itch" among college boys), also in fungus infections of the feet and other parts. The advantages of this preparation over the old, Whitfield's ointment, are: there are no erosive or excoriating effects (as with salicylic acid) even if the powder is concentrated. Salicylic acid must be used in weak concentration. Acetyl salicylic acid can be used as a dusting powder or can be incorporated in ointment bases. The other main advantage of acetyl salicylic acid is its analgesic effect. The itching and irritation are speedily relieved after application.

Since acetyl salicylic acid corrects the itching and irritation promptly on the outer genitalia, although it may recur if the discharge continues, use may be made of the tablet as a vaginal suppository to correct the cause.

A number of cases of discharge were treated after an attempt to rule out gonorrhea by smears and careful examination, and in which no further cause of discharge could be found (for example, no ulcer of the cervix).

If gonorrhea was not found or suspected, and no anatomical cause could be discovered for the discharge, the complaint was considered as a symptom to be cleared to the satisfaction of the patient, regardless of the demonstration of a particular organism.

The work of Carter and Jones strongly suggests that organisms may be present and not found by one examination, especially the yeast organism, and this group is especially known to be present and a trouble maker during pregnancy. The bacteriologic efforts and investigations are spent on repeated, diligent search for the Neisserian organism, methods for which are usually more available to the routine clinic not engaged in research.

The acetyl salicylic acid disk (aspirin tablet) is used after a vinegar douche (or 25 per cent sodium chloride), with simple instructions to insert one disk high up in the vaginal canal and leave it.

Douching is, of course, restricted during the last few months of pregnancy, so the disks alone are used.

As with other forms of powder or tablet applications, the patient is warned that the discharge may be apparently worse for a while, due to the fact that the content of the tablet was there to be discharged. Later, when the use can be reduced to one or two a week, or just during the menses, this difficulty is overcome.

Crushing the tablet just before or after insertion increases the effectiveness at times.

This simple procedure has been very effective in treating clinic cases where a simple, inexpensive method was required. The results were better than with the vinegar douche or sodium chloride alone.

The patients are put on this routine if no evidence is found of need of other therapy (sulfanilamide, cautery or surgery).

The writer has also obtained better results following the use of the acetyl salicylic acid powder with a small retained tampon. Tampons have not been previously advised during pregnancy, but no ill effects have been noticed in a fairly large number of cases.

Ultraviolet radiation and gentian violet over the vulva have been helpful and, in severe cases, shaving the vulva may be necessary.

SUMMARY

Trichomonas vaginalis, mycosis and the gonococcus are the three most common causes of leukorrhea during pregnancy.

Treatment of gonorrhea by sulfanilamide orally is augmented by local application of sulfanilamide in the vaginal canal.

A tampon retained five or six days seems to be beneficial.

An economical, simple and effective method of treating "nonspecific" vaginitis is by vinegar (or 25 per cent sodium chloride) douches, followed by acetyl salicylic tablets locally. Retained tampons seem to have some benefit here, also.

BIBLIOGRAPHY

1. Bland, P. B.; Goldstein, Leopold; and Wenrich, David H.: Trichomonas Vaginalis in Pregnancy. Amer. Jour. Obst. & Gyn., **21**:365-371 (March) 1931.
2. Buxton, R. Von L.; and Shelanski, H. A.: Ibid., **33**:842-845 (May) 1937.
3. Castellani, A.: Jour. Trop. Med., **19**:89, 1916.
4. Castellani, A.; and Taylor, F. E.: Jour. Obst. & Gyn. Brit. Emp., **32**:69, 1925.
5. Crossen, H. S.: Aphthous Vaginitis: Diseases of Women, Ed. 6, p. 285. St. Louis: C. V. Mosby Co., 1926.
6. Davis, C. H.: Amer. Jour. Obst. & Gyn., **18**:716, 1929.
7. Frank, R. T.: Gynecological and Obstetrical Pathology, Ed. 1, p. 141. New York: D. Appleton & Co., 1922.
8. Fulkerson, L. L.: Mycotic Vulvitis. Gynecology, Ed. 1, p. 154. Philadelphia: P. Blakiston & Son, 1929.
9. Glassman, Oscar: The Incidence and Treatment of Trichomonas Vaginalis in Pregnancy. J.A.M.A., **102**:1748 (May) 1926.
10. Graves, W. P.: Mycotic Vaginitis. Gynecology, Ed. 4, p. 274. Philadelphia: W. B. Saunders Co., 1928.
11. Haussmann, D.: (Translated by P. E. Walther.) Parasites des organs sexuels femelles de l'homme et de quelques animaux, avec une notice sur le developpment de l'Oidium Albicans Rob. Paris: Bailliere and Fils, 1875.
12. Jones, C. P.; and Martin, D. C.: Identification of Yeast-like Organisms Isolated from Vagina of Pregnant Women. Amer. Jour. Obst. & Gyn., **35**:98-106 (Jan.) 1938.
13. Karnaky, K. J.: Texas State Jour. Med., **32**:803-808 (April) 1937.

14. Kerr, J. M. M.: Aphthous Vulvitis. Clinical and Operative Gynecology, Ed. 1, p. 284. London: Harry Frowde & Hadder, Stroughton, 1928.
15. Moench, L. M.: Thrush of the Cervix Uteri. Med. Clinics N. Amer., May, pp. 1581-1583. Philadelphia: W. B. Saunders Co., 1929.
16. American Neisserian Society: Venereal Diseases Information, **19**:1283-1287 (Sept.) 1938.
17. Rodecurt, M.: Ztschr. f. Gerburtsch. u. Gynak., **115**:99-115, 1937.
18. Streit, K.: Ztschr. f. Geburtsh. u. Gynak., **114**:154-174, 1937.
19. Winckel, F.: Berl. Klin. Wchnschr., **3**:237-239, 1866.

DISCUSSION (*Abstract*)

Dr. William Bush Anderson, Nashville, Tenn.—Leukorrhea has not been so prevalent and troublesome in my practice as the literature would indicate. It is a symptom of underlying disease and in pregnancy, contrary to the general idea, it is not always wise to go through a long drawn out search for the cause. Cervicitis is not met with in the pregnant woman as often as in the non-pregnant woman, because cervicitis is to some extent a contraceptive, and if cervicitis is present in pregnancy, radical measures to cure it are contraindicated because of the danger of interrupting pregnancy.

All vaginal discharges are increased during pregnancy because of increased vascularity, as has been brought out in Dr. Hudgins' paper. The three most frequent causes of leukorrhea are gonorrhea, Trichomonas vaginalis vaginitis, and thrush. The most frequent is Trichomonas infection. The most important in the pregnant woman is gonorrhea. A quick microscopic examination will determine whether we are dealing with a gonococcus or Trichomonas. Neither can live and thrive in an acid secretion.

Hot vinegar douches (five tablespoons to two quarts of water) given slowly and repeated often may be sufficient to make the patient comfortable. However, if it is a gonorrhea, I swab the vagina with 20 per cent silver protein solution daily. If there is Trichomonas infection, I scrub the vulva and vagina daily with green soap and water, dry thoroughly, and in either case continue vinegar douches. For thrush, gentian violet, 1 to 2 per cent solution, painted on the vulva and vagina is probably the best treatment.

For cervicitis in pregnancy, frequent mopping with 10 per cent mercurochrome and vinegar douches suffice during pregnancy. Such treatment gives comfort to the mother, but does not guarantee a cure, and it must be remembered when the patient comes to delivery to protect the baby from infection. After delivery, if leukorrhea returns more radical treatment may be pursued.

I have had no experience with sulfanilamide as a dusting powder. It sounds good. It is a question whether acetylsalicylic acid is sufficient to return the normal hydrogen ion concentration to the vaginal flora.

In conclusion, our object should be to look after the comfort and welfare of the pregnant woman. In many cases treat symptoms rather than try to effect a cure where the cause is remote. With proper technic morbidity should not be increased.

Dr. Karl John Karnaky, Houston, Tex.—In the outpatient department of Jefferson Davis Hospital, Houston, Texas, we have treated more than 800 pregnant women for leukorrhea. Early in this series we aborted a few of our pregnant women when we coned, cauterized or coagulated the entire erosion of the cervix. As our studies progressed, we found that if one-sixth or one-eighth of the cervix be coagulated and after a two-week interval a similar amount coagulated again no abortions were produced. Superficial coagulation was used. The condition should be treated as early in pregnancy as is possible.

Dr. Hudgins is to be congratulated upon using acetylsalicylic acid, which has a pH of 2.9. This pH is the same as that of acetarsone and the other drugs that have been used successfully in the treatment of Trichomonas and other vaginal infections. It is the hydrogen ion concentration of the drug rather than any other property that destroys abnormal vaginal micro-organisms. I do not advocate any alkaline drug, such as silver picrate, salt and soda, magnesium sulfate and others, which are alkaline, because alkalinity causes the vagina to heal more slowly. Acid drugs, such as vinegar (five tablespoons to two quarts of tap water) and lactic acid help to heal the vaginal infections. In previous papers I have shown that as vaginal infection, whether Trichomonas or some other type, progresses the pH approaches the alkaline side. Consequently, the use of alkaline drugs is injurious rather than helpful in the treatment of vaginal infections.

Normally during pregnancy the vagina is in better condition than at any other period during a woman's life. There is more glycogen in the vaginal epithelium, which is broken down into lactic and other organic acids. The vaginal flora is less mixed. If alkalies are used, we are likely to raise the pH that nature maintains, and thus encourage a mixed vaginal infection, which is harmful.

Monilia albicans, which is not influenced by pH to any great extent, is best treated by 5 per cent gentian violet in 25 to 40 per cent ethyl alcohol. In some cases a 40 per cent solution may burn the vaginal mucosa. In the treatment of oral thrush, 5 per cent water solution of gentian violet should be used. I have shown by culture experiments and microscopic demonstration that few Monilia albicans are destroyed by 5 per cent water solution of gentian violet, but when 5 per cent gentian violet in 25 to 40 per cent ethyl alcohol is applied, over 90 per cent are killed. With this treatment we have had few cases of recurrence of Monilia, while with the watery solution we had many recurrences.

We know that Monilia albicans is rare in gynecologic patients. As a contrast, Monilia is present in 15.5 per cent of all the obstetrical outpatients. Monilia albicans is a common cause of pruritus vulvi and vaginal discharge during pregnancy; yet Trichomonas vaginalis is the most common cause of pruritus vulvi and leukorrhea in the pregnant as well as the non-pregnant woman.

Patients should be told to insert tablets inward and downward into the vagina toward the rectum. This causes the tablet to be placed under the cervix and keeps them from being inserted into the external os. We have not had any pregnant patients abort from inserting the tablets during pregnancy during the four years of our work at Jefferson Davis Hospital.

In conclusion, one should use only acids in the vagina and those who use alkalies such as salt and soda apparently do not know the normal physiology of the vagina.

Dr. Hudgins (closing).—Acetylsalicylic acid is an economical method to be used in the clinic where funds are not available for the more expensive commercial preparations.

THE PUERPERAL BLADDER*

By WALTER A. RUCH, M.D.
Memphis, Tennessee

The proper management of the urinary bladder during the first few days postpartum has been a problem which has puzzled many obstetricians. There is a wide diversity of opinion regarding its solution. According to one school of thought catheterization is always contraindicated; according to another, frequent catheterization is harmless.

If the first method is followed meticulously, that is, if the patient is never catheterized, many postpartum urinary infections will be prevented. It is generally agreed, however, that a patient should be catheterized upon the delivery table before forceps are applied or before any operative procedure is attempted. Likewise, the majority of obstetricians admit that the bladder should be emptied during long labor when over-distended or when it becomes an obstruction to the descending head. There is no doubt that a violation of these rules leads to excessive trauma and frequently results in a cystocele. The fact that the patient who receives analgesics during the first stage of labor is usually too drowsy to void voluntarily, is an added reason for catheterization. Granting that catheterization is necessary prior to delivery, can it be done without infecting the bladder?

In making a survey of the various technics employed in hospital deliveries throughout the country we are amazed at the number who carry out a sterile procedure in the preparation of their patient in the delivery room, and then defeat their purpose by inserting a catheter lubricated with a non-sterile lubricant. It is much better to insert the catheter without any form of lubrication. Also amazing is the frequency with which the urethra is traumatized by the use of a catheter which is too large, and the bladder is injured by the over-insertion of the catheter. A proper regard for asepsis and the exercise of caution in performing catheterization would obviate many infections of this type.

Although the majority of physicians agree that the bladder should be catheterized prior to delivery, there is a wide variation of opinion as to the advisability of catheterization during the first few days postpartum.

Curtis[1] is of the opinion that postpartum patients will usually void voluntarily if given sufficient time. He also feels that, even though extremely distended, the bladder will return to normal more quickly if not catheterized.

Brown,[2] who has conducted extensive studies of the postpartum urinary bladder, is of the opinion that catheterization is seldom if ever advisable, even on the delivery table. From similar studies, McLane[3] has concluded that postpartum catheterization should be minimized. Mussey,[4] on the other hand, agrees with Randall and Murray[5] that postpartum catheterization is the better course to follow. The latter authors have reached this conclusion from an investigation of 984 cases. We quote from them as follows:

"Our care of the urinary bladder postpartum is based on the principles that over-distention of the bladder and the presence of residual urine favor infection of the urinary tract. We recognize a small group of women who are unable to void spontaneously postpartum, apparently from no demonstrable cause. Nervous inhibition, posture and decreased intra-abdominal pressure may explain this. In caring for these patients, as well as all others, an attempt is made to cause spontaneous urination by such means as warm external 'pitcher douches.' However, these are not persisted in to the point of exhausting the patient. We believe that too great value may be placed on spontaneous urination during the puerperium through fear that catheterization will cause infection of the urinary tract. It has been shown by Cabot that infection rarely, if ever, is caused by aseptic drainage by catheter in itself, but that previous over-distention and the persistent presence of residual urine are etiologic factors."

As a basis of study we catheterized 100 consecutive patients on the third day postpartum. These patients then received repeated catheterization until the bladder showed less than four ounces of retention. These cases were analyzed in regard to the incidence of retention following prolonged labor, analgesia and operative delivery and a comparison made as to the occurrence of postpartum pyelitis as compared with a series of 100 in which no catheterization was done.

From this investigation it was found that of the 100 consecutive patients catheterized on the third day postpartum, forty had four ounces or

*Read in General Clinical Session, Southern Medical Association, Thirty-Third Annual Meeting, Memphis, Tennessee, November 21-24, 1939.

more of urine in the bladder. Of this number, fifteen were unable to void by the third day postpartum, and the other twenty-five had a residual of four ounces or more immediately after voiding, and sixteen cases had from one to three ounces.

The majority of patients showing an appreciable retention were primiparae. The percentage of patients who cannot urinate spontaneously and those that have a retention increases as the length of labor increases. This suggests that fatigue is a factor. Of course, in this series those patients who went through a prolonged labor, as a rule, received more analgesia during labor and more anesthesia during delivery than those whose labor was of shorter duration. These factors may affect the ability to void.

Factors thought to be associated with increased trauma to the vaginal wall and cervix, such as spontaneous rotation in cases of occiput posterior position, operative correction of errors of rotation and premature rupture of the bag of waters, did not materially influence the frequency of retention of urine. Injury to the bladder or urethra did not occur in any case.

Episiotomy and repair were performed in a large number of cases in which a retention was found. It must be remembered, however, that these patients were primiparae who had prolonged labor.

In the presence of retention of more than 20 ounces we found the insertion of a Foley type of retention catheter and inflation of the bag with 5 c. c. of acriflavin solution more satisfactory. The catheter was left in the bladder for several days and the bladder irrigated three or four times daily with 1/5,000 acriflavin solution.

Eight of the patients in this group developed postpartum pyelitis. This may be compared with an incidence of 15 cases of postpartum pyelitis observed in a parallel group of 100 patients who were not catheterized.

In another series of 100 consecutive cases, the patients were catheterized upon the delivery table and the specimens obtained were cultured immediately. We then catheterized these same patients on the third day postpartum and made cultures of the urine for comparison with the delivery specimen. The following table shows the results obtained in this study:

Table 1

No. of Cases	Delivery Specimen Culture	Third Day Postpartum Specimen Culture
10	Positive	Positive
10	Negative	Negative
80	Negative	Positive

Analysis of Delivery Specimen Culture

Bacillus coli communis	4
Nonhemolytic streptococcus	2
Staphylococcus aureus	4
	10

Analysis of Third Day Postpartum Specimen Culture

Bacillus coli communis (alone)	28
Bacillus coli communis with Staphylococcus aureus or albus	7
Diplococcus pneumonia	9
Staphylococcus aureus	15
Staphylococcus albus	19
Nonhemolytic streptococcus	10
Bacillus alkalines	1
Bacillus enteriditis	1
	90

From the results of this series it is obvious that we were unable to develop a technic of catheterization which was free from urethral contamination. The only specimens which showed no growth were obtained by washing the urethra with a spray of 1/1,000 solution of an organic mercurial a few minutes before catheterization; then an intern and nurse, both wearing sterile rubber gloves, performed the catheterization, the former passing a glass catheter with rubber tip while the latter held the labia apart with the gloved hand.

At the suggestion of Dr. T. D. Moore, of Memphis, we have been using the following formula as a lubricant for catheterization:

Tragacantha	10 grams
Oxy mercuric cyanide	3 grains
Glycerine	8 c. c.
Distilled water q. s. ad.	500 c. c.

This jelly is sterilized by the presence of the oxy mercuric cyanide, but may be placed in large mouthed jars and autoclaved if desired. The jelly is then placed in an old sterile 20 c. c. Luer syringe, which is left upright in a jar of mercury cyanide solution when not in use. This has

proven a satisfactory as well as an economical technic.

In spite of our difficulty in avoiding contamination the results of our small series were fairly comparable with previous results published in the literature. In 1933, Brown[2] reported 196 cases wherein a positive culture was obtained. The colon group was present in a total of 62 per cent of this series, and in pure culture in 43 per cent.

Just what role urinary stasis in the postpartum bladder plays in the etiology of postpartum pyelo-ureteritis, pyelitis and pyelonephritis is a subject which has not been definitely determined. McLane and Traut[6] in May, 1937, discussed the relationship between infected urine and the etiology of pyelitis in pregnancy. For comparison, they cultured bacteria from both the bladder and the right ureter. To quote from their article:

"The regurgitation of infected urine from the bladder into the ureters was not demonstrable in any of these patients, for only once in 115 simultaneous observations of bladder and ureteral urine was the same organism recovered from both fields, although, as stated above, several of the patients obviously had some degree of stasis of bladder and ureteral urine.

"That urinary stasis plays a major role in explaining the etiology of pyelitis and ureteritis in pregnancy is unquestionable. This has impressed everyone who has made a study of this disease. The portal of entry of the chief micro-organism concerned, Bacillus coli, has not been satisfactorily clarified. From investigations such as this, it becomes more and more apparent that bacillary access into the ureter and kidney pelvis is, in all likelihood, not from the urinary tract itself in most instances, but is probably to be found in the lymph stream and then only when there is disease or stasis in other organs of the lower abdomen and pelvis which harbors the colon group of micro-organisms."

Traut[7] again in September, 1937, listed the three paramount factors in the etiology of this condition as stasis, trauma and infection, and pointed out that all three factors are present in the postpartum patient.

McLane, also, in a second article published in 1939, reported a five-year study of pyelitis in pregnancy, including 62 postpartum cases. In this article the author reaffirmed his opinion as expressed in his joint article with Traut[6] in 1937, namely, that infection is carried from the bladder through the lymphatics of the ureter and para-ureteral tissue to the kidney pelvis, and does not ascend the lumen of the ureter against the current of urine. The author discusses the postpartum bladder as follows:

"Additional proof of this theory of bladder infection can be given by stating that the duration of labor in our postpartum group was about twenty-two hours as contrasted to the average duration of fourteen hours in a large group of normal multiparas and primiparas. In the twenty-two patients who developed pyelitis on the first day postpartum, the average length of labor was twenty-two hours, which means that for this period of time the bladder and lower urinary tract suffered constant impingement between the fetal head and the more rigid structures of the pelvis. The high incidence of bladder infections following long labors is so well recognized as not to need further emphasis."

In the study of our third day cultures we are convinced that the presence of bacteria in the bladder is not the only factor in the etiology of postpartum pyelitis; otherwise, the incidence would be much higher. The real danger lies in over-distention of the bladder and the collection of stagnant infected urine.

CONCLUSIONS

(1) Catheterization should be avoided when possible.

(2) When labor is short and delivery readily accomplished, catheterization may not be necessary. Unfortunately, such cases are limited.

(3) When a patient in labor is unable to void voluntarily, catheterization is indicated only when the retention impedes the progress of labor.

(4) Compared to the postoperative case little, if any, pain is caused by postpartum retention.

(5) Catheterization is indicated when small quantities of urine are voided at frequent intervals, even though pain is absent and the full bladder cannot be palpated.

(6) Bladder tone is lost by distention. Recovery is favored by intermittent catheterization, if the amount of retained urine is less than 20 ounces. If more than 20 ounces are retained, the introduction of a Foley catheter is advised.

(7) The incidence of postpartum pyelitis is not increased by bladder bacilluria except in the presence of stagnant urine.

BIBLIOGRAPHY

1. Curtis, Arthur H.: Personal communication to the author.
2. Brown, T. K.: Sou. Med. Jour., **26**:788, 1933.
3. McLane, Charles M.: Amer. Jour. Obst. & Gyn., **38**:117, 1939.
4. Mussey, Robt. D.: Personal communication to the author.
5. Randall, Lawrence M.; and Murray, Stephen E.: J.A.M.A., **101**:2023, 1933.
6. McLane, Charles M.; and Traut, Herbert F.: Amer. Jour. Obst. & Gyn., **33**:828, 1937.
7. Traut, Herbert F.: Amer. Jour. Obst. & Gyn., **34**:365, 1937.

RADIATION THERAPY AS AN AID IN THE DIAGNOSIS AND TREATMENT OF CERTAIN ABDOMINAL TUMORS*

By E. A. MERRITT, M.D.
and
RALPH M. CAULK, M.D.
Washington, District of Columbia

The material for this presentation is gained from a study of a group of 212 patients with deep-seated malignancy who have had radiation therapy in our clinics during the past twenty years. They are of a diverse nature, consisting of lesions of the ovary, colon, rectum, stomach, pancreas and several of undetermined origin. Five brief case reports will be given with a discussion of each, which will serve to illustrate certain pertinent facts which may be used as a guide in the management of these cases.

Case 1 (Treated by Dr. T. A. Groover).—M. W., aged 28, was first seen in July, 1922. He gave a history of having had an undescended testicle removed two years previously, which may have been the seat of a new growth. Examination disclosed a palpable mass in the epigastric region the size of an orange which, upon fluoroscopic and radiographic examination, was seen to displace the stomach to the left, producing a six-hour retention, but not invading the wall. This was thought to be a metastatic malignancy of testicular origin. Roentgen therapy was given over anterior and posterior portals during the next two months of sufficient intensity to produce a deep tanning of the skin. This resulted in the complete disappearance of the tumor. There has been no evidence of recurrence to date.

This is an example of an extremely radiosensitive tumor, treated only by radiation, that has remained alive and well for a period of 17 years.

Case 2.—F. W., aged 40, was first seen in June, 1927, complaining of extreme lassitude and a mass in her abdomen. Examination disclosed a palpable, hard, fixed mass in the abdomen, to the right of the umbilicus. Gastro-intestinal examination was negative. The patient was seen by two prominent surgeons and regarded as inoperable. She was given fractionated x-ray therapy over the anterior and posterior abdomen in sixteen days' time, following which the tumor disappeared. Later she developed an enlarged lymph node in the left cervical region which also disappeared under the influence of irradiation. The patient remains perfectly well to date.

This is another example of an extremely radiosensitive intra-abdominal tumor of unknown origin that was treated by radiation only and has remained alive and well for a period of 12 years.

Case 3.—M. W., aged 50, was first seen in January of 1934, with a history of abdominal pain of three months' duration, rapid loss of weight and hematemesis. Examination disclosed a palpable abdominal mass which was shown by fluoroscopic and radiographic examination to produce a large filling defect in the posterior wall of the stomach. The patient was given 4,500 r in 23 days' time by anterior and posterior portals. After one year he had gained 50 pounds in weight. Two years later he developed a recurrence and was given a total of 8,000 r through anterior and posterior portals. He has remained well to date.

This represents a gastric malignancy which, under the influence of roentgen therapy, has remained alive and well for over five years. In our experience, gastric malignancy arising in the cardiac portion has shown a surprising degree of sensitivity. Inasmuch as these lesions are invariably inoperable, roentgen therapy is the treatment of choice. If the dosage is adequate an excellent degree of palliation often follows.

Malignancy developing in the pyloric region, however, tends to invade adjacent vital organs early, produces early obstruction and has for the most part proven refractory to treatment, so much so that with roentgen therapy alone palliation has been poor at the best. It is probable that if all of these cases were given a course of x-ray therapy prior to operation, the surgical statistics would be improved and many of these that are inoperable would become operable due to the favorable influence of radiation upon infection and radiosensitive cells.

Case 4.—F. W., aged 50, was first seen in August, 1938, complaining of cramp-like pains in the upper abdomen. Examination disclosed a tumor mass the size of a grapefruit, which was freely movable in the upper left quadrant of the abdomen. Fluoroscopic examination disclosed a high degree of obstruction in the large intestine at the splenic flexure. This was thought to be malignant. The patient was given a total dose of 3,000 r units in 25 days' time through three portals, which provoked a complete disappearance of the palpable tumor and a diminution in the obstruction. The tumor was resected three months after the beginning of treatment. At operation a small annular growth at the splenic flexure was found with no glands. This was diagnosed histologically as papillary adenocarcinoma. This patient remains well to date.

In this instance we have a large tumor of the colon in a patient who was a poor operative risk transformed into a small, easily resectable lesion with the patient in excellent condition for surgery. The element of infection alone in this type of malignancy constitutes a large portion of

*Read in Section on Radiology, Southern Medical Association, Thirty-Third Annual Meeting, Memphis, Tennessee, November 21-24, 1939.

†From the Radiological Clinic of Drs. Groover, Christie and Merritt.

‡From the Garfield Memorial Hospital and Warwick Memorial Clinic.

their bulk and *per se* would be an indication for irradiation prior to surgical intervention. We earnestly advocate a course of x-ray therapy in all lesions of the colon before operation because it reduces both the radiosensitive and the inflammatory elements of the tumor, thus improving the general condition of the patient and facilitating operative procedures.

Case 5.—F. W., aged 47, was first seen in August, 1937, with a history of painless jaundice and clay colored stools of three months' duration. At operation the patient was found to have a large, hard, nodular mass in the head of the pancreas obstructing the common duct. The gallbladder was anastomosed to the jejunum and a diagnosis of carcinoma of the head of the pancreas made. The patient was given x-ray therapy, 4,500 r, in nineteen days' time through multiple ports. The patient remained perfectly well for fourteen months, when the jaundice returned and the liver enlarged, with vomiting. She was given additional therapy, a total of 4,500 r, directed toward the liver. This was followed by some improvement, but three months later the patient developed an acute intestinal obstruction. At operation no evidence of malignancy was found. The small bowel was obstructed by adhesions and a gastro-enterostomy was done. The patient developed a wound infection and died six months later of multiple abscesses of the liver and lungs.

This is an example of a carcinoma of the head of the pancreas in a patient who lived two years without evidence of recurrence following roentgen therapy.

In reflecting upon this group of cases and applying the facts at hand regarding malignancy elsewhere, we arrive at the following conclusions:

(1) The lymphomatoid diseases have abdominal manifestations, both visceral and glandular. Their response to radiation therapy is prompt and often phenomenal. Such response is diagnostic and is an indication that these tumors are problems for the radiologist only, as is the case in all extremely radiosensitive neoplasms.

(2) The sensitive and inflammatory elements of the more differentiated malignancies in the abdominal cavity constitute a varying proportion of their volume. The dissolution of these elements by radiation therapy often facilitates technical operability, both locally and generally.

(3) All malignant tumors manifest a certain favorable response to radiation therapy, the degree of which cannot be predetermined clinically nor histologically.

(4) We must not be deterred by the fact that many of these cases are doomed as utterly hopeless either prior to or after operation. Some of the most dramatic episodes in the realm of roentgen therapy occur in just such cases.

(5) In view of the above facts, we feel in the light of our present knowledge that the therapeutic test of irradiation is invaluable as a preliminary procedure in the diagnosis and treatment of the large majority of abdominal tumors.

DISCUSSION (*Abstract*)

Dr. Elliott M. Hendricks, Fort Lauderdale, Fla.—Two points I believe are worthy of further emphasis. First, in spite of adverse evidence, a curative rather than a palliative dose of radiation was resorted to. I believe we must have courage when we use the x-ray and use adequate doses in all cases save those that are definitely *in extremis;* in other words, those in whom large doses of radiation might prove fatal.

I have in mind a case of extensive bladder tumor, in which 14,000 r were administered over a period of four months, with a complete disappearance of the tumor, the patient remaining well and free from all evidence of the tumor for over five years. The reaction following this radiation was very severe, the skin hanging in festoons of bullae. I feel that any dose short of this massive dose would have been inadequate and a waste of time. The radiation reaction was recovered from and the patient is alive and happy today.

Secondly, even in the cases of nonsensitive tumors, the evidence here presented teaches us that radiation can be a very necessary adjunct to surgery. Apparently hopelessly inoperable tumors are often brought within the realm of operability and complete eradication is ofttimes possible when the tumor is brought down to its true size by radiation.

In this connection I should like to say a word about pathologic reports. Expressions by the pathologist as to the degree of radiosensitivity to tumors is a practice which I believe should be frowned upon. In numerous cases no attempt has been made to apply radiation where the pathologist has expressed an opinion of radioresistance and the surgeon does not avail himself of such help as the radiologist can give him in this type of case.

To my mind, it would be better if the pathologist limited himself to a description of the cellular structure and let the radiologist interpret from this the degree of radiosensitivity of the tumor with which he is dealing.

As yet I have heard of no one to whom has been relegated the divine power to determine whether or not a given case is hopeless. Until that time, we should carry on with the hope that the measures we are carrying out will prove adequate to effect a cure, even though the outlook seems bad.

Dr. Walter S. Lawrence, Memphis, Tenn.—If you will pardon me for harking back a bit, I think that I can tell you something of a case that was more extremely radiosensitive than any that has yet been mentioned here. I think, Dr. Martin, you may recall some of the discussion on this case. I presented the data on this case at the meeting of the American Roentgen Ray Society in New York City in 1908.

I made a fluoroscopic examination of a man of 40 and films revealed a tumor in the chest approximately five inches in diameter, in the upper part of the mediastinum. There was collateral circulation all over the chest wall, black and blue. The man could only sleep ten minutes at a time at night and was rapidly getting worse.

Dr. Ochsner, of Chicago, diagnosed the condition rapidly growing dermoid cyst and gave a prognosis of death within three months.

In those days we had nothing by which to measure the x-ray. It was simply guesswork. I did the guessing in this case.

He began treatment in Memphis on October 30. On November 6, he reported improvement. I treated him every other day through November. On December 6, he was very much better and the tumor at that time had diminished to about the size of an orange.

I kept track of him for the next three years. That was the most sensitive tumor with which I ever came in contact. Years after I reached a diagnosis of lymphosarcoma of the mediastinum.

The man lived three or four years and died suddenly on a trip out of Memphis.

I report one other case, a young man about 30 years of age whose wife had frank tuberculosis. He began to be sick, to lose weight and energy, was particularly weak and had abdominal pain. I started x-ray treatment about four years ago over the painful area, the abdomen. With a very moderate degree of treatment (I have never given him more than 125 r) he was entirely relieved of pain. Pain returns at intervals and I treat him again. The patient is in excellent condition and has not lost a day's work for about that length of time.

Just about three years ago, a year after I first treated him, he developed a little gland in the neck, which we examined. It turned out to be Hodgkin's. A small gland was removed from the supraclavicular region. The patient had done splendidly all this time. It took a year to make the correct diagnosis.

Dr. Harold G. F. Edwards, Shreveport, La.—I think Dr. Merritt's and Dr. Caulk's paper is a very splendid presentation of what we may accomplish in radiation therapy. No one has kept back the progress of radiology more than the pathologist. I am in a constant fight with my pathologist, and he is a very splendid pathologist, too.

The average surgeon who gets a report from a pathologist stating that the tumor is radioresistant forgets that radioresistance is one thing and radio-curability is another thing. Furthermore, a radiosensitive tumor does not necessarily mean a radio-curable tumor. As a matter of fact, the converse may be true. The average physician who sends a biopsy to the pathologist forgets that the pathologist is only looking at a microscopic part of the problem and that the radiologist who avails himself of all of the material is certainly in a better position to arrive at a conclusion as to what should be done. This has been repeatedly demonstrated in my experience.

Another thing which frequently comes up is that the pathologist sees a little bit of uterine curettings and says: "Adenocarcinoma of the uterus, highly malignant; the patient should receive this or that," without knowing anything about it, or he will say: "This looks like chorio-epithelioma; the patient should be watched." These things are absolutely asinine. The radiologist should put his foot on it and let the pathologist realize that what we want is a tissue diagnosis without directions as to whether or not we can treat the patient.

Dr. Wright Clarkson, Petersburg, Va.—I did not understand how many of these cases had biopsies, and if Dr. Caulk will answer this question I will appreciate it.

Dr. Charles L. Martin, Dallas, Tex.—Will Dr. Caulk please tell us in closing whether he has treated any cases successfully in which adenocarcinoma of the fundus of the stomach was diagnosed by means of a biopsy? It is my impression that no such positive diagnoses have been made in the cases reported previously by Dr. Merritt. Lymphosarcoma is relatively common in the fundus of the stomach and we believe that the one case with a large fundus tumor treated successfully with radiation in our own clinic probably was a lymphosarcoma.

Dr. Caulk (closing).—This paper was written with the idea of provoking a discussion of just this nature. In answer to Dr. Clarkson's question, only one of the cases had a pathologic diagnosis, the one of carcinoma of the colon.

In answer to Dr. Martin's question, we do not have an adenocarcinoma of the fundus of the stomach that has gone the five-year limit with a pathologic diagnosis. In those cases, as I have said in the paper, there are certain radiosensitive elements in adenocarcinoma of the stomach which respond to radiation, and it is due to this response that a surprising degree of palliation is often accompli hed.

We have the same difficulty with the pathologic diagnosis that Dr. Edwards does. We take exception to the fact that everyone has taken to the "pathologic yardstick," as Dr. Cole, of New York, puts it, as the criterion for the diagnosis of malignancy.

All of us who have seen cancer day in and day out are thoroughly familiar with the limitations of the microscopic examination of tissue. We feel that the history and careful clinical examination, together with the type of response of tumors to radiation, are equally, if not more, significant than a pathologic report confirming or not confirming the diagnosis.

DOUBT: A HEALTHY STATE OF MIND*

By W. W. YOUNG, M.D.†
Atlanta, Georgia

Certainly, for at least the past two decades the world has been in a state of economic, political and social uncertainty. This has created an atmosphere of extreme insecurity in the lives of people, both individually and collectively. To offset this general sense of insecurity with its accompanying apprehensions, there has arisen a strong urge for specifics. This is an urge to know the answers, not in uncertain terms, but with a definite concreteness, to secure that comfort which human beings find essential. It is

*Read in Section on Neurology and Psychiatry, Southern Medical Association, Thirty-Third Annual Meeting, Memphis, Tennessee, November 21-24, 1939.

†Associate Professor of Psychiatry and Chairman of the Department of Psychiatry and Neurology, Emory University Medical School.

an effort to be sure in a world where nothing really seems sure.

As a consequence of this, in every aspect of life supposed panaceas have been offered as assured answers to the various crying needs of the human race. Politically, there have come into existence various social ideologies which have gained unpredictable credence in those more fertile regions where insecurity is predominant and where greatest assurance is needed. In every instance these ideologies in their final outcome have relieved people seemingly of the necessity for making political decisions for which they feel inadequate and have offered an easy solution for political, economic, and social ills. The economic uncertainties have been met with various formulae, more or less unsound, also in the category of comfort giving, the often ephemeral symbols of security. We find these philosophies existing in Nazism, Stalinism, Fascism, and to some extent in the ideas promulgated in our own country. Out of these philosophies has evolved an ultra-nationalism in which security has been sought in an isolationist attitude, to the destruction of that cooperation which has been visualized as essential to world peace and world happiness. Men tend to lose the sense of relationship so essential to true progress.

This urge toward specifics has strongly influenced the attitudes and philosophies of the various disciplines having as their purpose the solution of the problems confronting mankind. Sociology, theology, medicine, each has tended to think of itself as the one cure for human ills and hence, in time, has tended to pursue the policy of isolationism. This has created a spirit of jealousy of prerogatives and fear of possible encroachments. Thus, each discipline sooner or later sets itself up more or less as a specific and fosters this attitude in the individuals making up the particular group.

This spirit, to a great extent, has taken hold upon the attitudes of medical practice as a whole, to the detriment of progress in the business of evolving a better world to live in and healthier people to live in it. This has happened despite the fact that over and over again the medical profession is frustrated in its efforts to cure, by lack of cooperation with other resources. It is well recognized that patients in the hospitals, who belong in the low-income group, return to their homes only to get sick again and return over and over. In many instances this is due to lack of proper food which they are unable to buy. They then become repeaters who act as a constant frustration to the physician and who, as chronic hospital inhabitants, constitute an unnecessarily heavy burden upon the taxpayers. Both of these denouements could be obviated by a close cooperation between the disciplines of medical practice and social agencies, both case-work and relief. There are exceptions to this general tendency for the disciplines of medical practice to set themselves up as specific and to pursue a policy of isolationism and these constitute wholesome islands of right-thinking from which may grow philosophies more adequate to meet the needs. The cooperation between psychiatry, psychology, sociology and authropology in the study of school children and their attendant problems is a good example. On the whole, however, essential cooperation is woefully lacking.

The urge to "specificity" has been a strong influence within the medical disciplines in determining the form of approach in both diagnosis and treatment. Consequently, the physician wants to know "what is the matter" with a person and this "what is the matter" must be expressed in very concrete terms. On the other hand, when concreteness seems quite elusive there is much tendency to evolve theories of cause into which an effort is made to fit the patients in question, a sort of Procrustean process. This often leads to the ignoring of facts which do not conform to preconceived theory. In therapy, too, there is a mad urge for a something definite which will turn the trick. There is much talk of specific therapy. Arsphenamine, sulfanilamide, "shock treatments," fever therapy, all seem to offer utopian benefits which lead the practitioner like a will-o'-the-wisp into quagmires of neo-charlatanry and away from sane thinking. Too often the fields where benefits have been fairly well proven are forgotten and the specific becomes a nostrum, a cure-all.

All of these attitudes permeating the general body of medical practice have a very strong influence upon the individual physician. Because of this there is too much tendency to look upon a human being as a static quantity with static qualities, both so-called normal and abnormal.

> "Life is not an idle ore
> But iron, deep dug from central gloom,
> And heated hot with burning fears,
> And bathed in baths of hissing tears,
> And battered with the shocks of doom,
> To mould and use."

Actually, the human organism is a fluid, dynamic, changing entity living in an environment

of the same character. The same may be said of the body politic in the midst of which the person lives and which constitutes the most important factor in the total environment of this person. Consequently, the chase after "specificity" is largely an illusion because such a concept cannot exist in a world of relativity. All this has been recognized, but reiteration seems necessary. Otherwise there is a constant tendency, particularly with patients who are seen over long periods of time, to lose sight of the fact that the individual varies in many respects from day to day, week to week, and month to month.

An attitude of biological relativity must be assumed for an adequate approach to the persons under a physician's care. This means that they should be handled biographically and this can be done only by a constant rechecking of the history and the conditions of their structure and functions. It is a running chronicle to which only death can put an end. Too often denouements are reached because therapy continues to be aimed at conditions existing at one time, losing sight of the fact that many changes are taking place in the meantime. Diagnoses are often missed by too dogmatic and especially too static an approach to the patient's daily or weekly visits. The individual does not stand still and study and therapy must be adapted to this fact.

These facts could be illustrated by many examples, but for lack of time and space, one only will be cited.

This is a man who in 1935 was thirty-nine years of age and a successful business man. He was a sickly child, reared in a home of much domestic strife. His father died when the patient was twelve years old and the mother, who was an invalid at that time, died three years later of pernicious anemia. The patient was then reared in a foster home. He was out of school on account of health for rather long intervals on three different occasions. One of these occasions, at the age of twelve years, was due to the crushing of a foot between the couplings of two freight cars. Because of his poor physical condition he had a strong drive for health and, in spite of his bad foot, he chose running as his method of building up his body. This resulted in his finally becoming the champion runner for the state. One day, at the age of thirteen, he exercised very strenuously and found he could not speak and had extreme generalized weakness. This necessitated staying in bed several days, with complete recovery. He finally attained a very good physique and was later in the World War. After the war his life was that of a rather sedentary business man with occasional games of golf. In 1923, twelve years ago, when trying to make a deal over the telephone while away from home, he found he had a great deal of difficulty understanding what was said. This cleared up. A year ago he had an attack of motor aphasia and went to bed for six days when this too cleared up. Eight or ten years ago he consulted an internist because of intense periodic headaches. The headaches usually came on between noon and 5 p. m. In between headaches he had a peculiar sensation in the head and also in the right leg. Two to three hours before the headaches he was warned by tingling in both feet, an uneasy feeling in his stomach and general nervousness. The headaches were confined to the right side. Recently he found that he fatigued extremely easily. Whereas he formerly could play eighteen holes of golf with zest, now he could scarcely finish nine. At this point he was referred to the psychiatrist. Because of lack of physical findings by which to explain the symptoms he was sent with a diagnosis of neurosis.

At that time the story which he gave did not fit into our conception of the neurotic make-up. It was noticed during the interview that when he glanced either to right or left the eyes failed to remain parallel. With this exception and an apparent nystagmus in all planes, neurologic examination was entirely negative.

Laboratory findings showed basal metabolic rate minus 22; blood sugar tolerance curve normal; blood chloride normal; blood count, differential and hemoglobin normal.

With the prominent system of extreme fatigability relieved somewhat quickly by rest and interpreting the eye findings on the same basis, a tentative diagnosis of myasthenia was made. Therapy directed at this for five months, including thyroid because of the low basal metabolic rate, was met with ups and downs, but no marked improvement. Dissatisfied with results, he was sent to the Mayo Clinic without further check-up. Their report showed:

"Neurologically it was found that there was a rather marked nystagmus both in the horizontal and the vertical direction. The eye examination showed the fundi to be essentially negative except for some slight temporal pallor of both discs. The field examinations showed a decided contraction in both fields that appeared to be due to fatigue. Doctor Bair, who went over the fields very carefully, was rather perturbed by the field examination and wondered whether there might be a cerebral lesion to account for the contraction of the fields. However, in reviewing the problem it seems that one must consider this field defect more in the light of a fatigue phenomenon. The muscular power throughout showed very little disturbance. The deep reflexes were slightly more active on the left side, with a positive Hoffman in the left hand. The abdominal reflexes were sluggish, the lower abdominals on the right not being obtained. There were bilateral Babinskis with positive Chaddock responses. The coordination seemed unusually good, although in walking there was a tendency to a very slight jitteriness. A part of his gait disturbance is, of course, the result of his old foot injury. Joint and vibration sensibilities were unimpaired and no sensory disturbance could be mapped out. The spinal fluid examination gave a negative Kolmer and Kline, total protein 45 mg., 11 small lymphocytes, and a gold curve of 2232200000."

Their diagnosis was "diffuse nervous system disturbance, either myelo-encephalitis or multiple sclerosis," with treatment based on the probability of the latter

condition. Of course it seems probable that there was a coexisting migraine.

On his return to Atlanta he was put under the care of Dr. Richard Wilson for treatment. During this time he saw Dr. Gordon Holmes, of London, who did not think the condition multiple sclerosis, but advised, too, that treatment be carried out as though it were this. After a period of three years with prolonged intensive use of iodobismuthate of quinine and the administration of vitamins his condition has remained stationary.

This case is used to illustrate the thesis of this presentation: that the patient should be approached biographically both as to his past and his present, remembering that the human organism is not static. This means frequent checks on complaints and physical findings in order to get the proper continuity. There is too much tendency to view the patient in cross-section and in the face of a lack of concrete findings to place him in the category of the neurotic. Too often the placing in such a category by the internist shuts the doors to facility in thinking and to opening of new avenues of approach.

The plea, therefore, is to keep a question mark before one. A healthy attitude of questioning one's own conclusions and those of others should be assumed, particularly now with this strong urge toward specificity, whether it be in the case of attitudes of the whole group, formulation of theories, or the diagnosis and treatment of the individual. This will steer one away from that dogmatism which stultifies efforts in a world of relativity. And in all of this the relationships of the whole must not be overlooked, since it is only by a healthy cooperation of all disciplines that the ultimate purpose for human welfare may be relatively attained. Thus may be avoided the pitfalls of isolationism, the handmaiden of specificity. This is a plea for clear thinking, and for dealing with facts as found in an ever-renewing story rather than as preconceptions growing out of rigidly formulated theories.

478 Peachtree Street, N. E.

DISCUSSION (*Abstract*)

Dr. Rock Sleyster, Wauwatosa, Wis.—It is important that people be made to realize that mental health is a condition that indicates not only freedom from insanity, but it means a functioning of the individual in life, freely, easily, happily, and productively. One of the greatest missions of our specialty at this time is to carry this idea of mental hygiene not only to the profession, but to the public.

Dr. Frank Luton, Nashville, Tenn.—We must be constantly alert to the multiplicity of potentialities within a patient, for variations due to changing status and changing experience. We should develop a conscience that will not allow the specific for paresis or the specific for schizophrenia or the streptococcus to influence our interest in paresis, schizophrenia or other streptococci.

Kraepelin did a great deal for psychiatry when he brought some order into the chaotic field and gave us some patterns of behavoir that seemed to occur with regularity, but when he gave us the term "dementia praecox" he gave us a term that stated the prognosis in the very name, and who wants to work on a hopeless problem? Is that the reason for the long delay in the concentrated study of dementia praecox? With these question marks in mind, what will metrazol, insulin, and other treatments stimulate in regard to further work?

Adolf Meyer, in his own school, and his teaching has spread to many medical schools, is teaching his students through psychobiology to start off with the feeling that the patient behaves as he does in sickness or in health because of many factors, factors that are relative, none of them specific, but, nevertheless, important in understanding human behavior. He speaks of the dynamics of behavior, behavior in terms of a life chart, or in terms of the longitudinal section, in terms of facts constitutional, facts situational, and facts that come through experience. When he diagnoses abnormal behavior, he speaks of reaction types, patterns of behavior that are relative, flexible, to be considered in the light of what has happened and what is happening. And finally, in treatment, there is the urge to deal with the facts that are at hand, to formulate them, to reformulate them from time to time when new facts appear, and then the work sheet, with its space for gaps, is concrete evidence of this attitude that Dr. Young has discussed.

Dr. Carroll C. Turner, Memphis, Tenn.—My friend, the essayist, pleads for a genetic, dynamic approach to the ills of mankind. He proclaims an ideal which we now term psychobiology. In essence this is a study of the unitary activity, or overt and implicit behavior of the individual, together with a consideration of all the biologic factors which have to do with his existence as a person, beginning with his pre-existence on through the various periods of his life, intra-uterine, infancy, childhood, adolescence, maturity and involutional. This makes sense and constitutes a sound, both-feet-on-the-ground approach.

But why should we set it up as a new approach in our armamentarium of diagnosis and treatment? Was it not with the very use of this knowledge that the old time family physician depended implicitly for his professional skill? To him was given the opportunity of treating not one individual or one generation, but several, constituting the composite links of the chain composing the family. He delivered grandma, treated her children, delivered these children's children, and treated them. He knew intimately the biog-

raphy of each. Therefore, he knew the genetics of each. He knew all the successes and failures, the ambitions and frustrations of every member of several generations. He knew all the skeletons in the closet. He could prophesy which boy would be outstanding in scholarship or athletics in school. He could anticipate which girl would marry early and which would be an old maid. He knew which one was predisposed to colds and rheumatism, and why some were more emotional and suffered the hives after a fish dinner more frequently than another of the same generation. He could anticipate overt behavior, and not infrequently he could sense abnormal, implicit behavior.

From our drive for "specificity" have resulted the various medical specialties and super specialties. In the build-up of the latter, may it not be possible that we may break down the very "specificity" which we are making our goal? After all, the human organism is a biologic unit. Let us all offer a prayer that we may not stray too far from the biologic concept.

In this light, can we justify the specificity that follicular tonsillitis is evidence of oral eroticism or that a nasal drip is a secondary sexual discharge? In such a concept, where shall we place pathology and bacteriology? If we deny the reflex theory or the absence of conditioned reflexes as a part of behavior, where then shall we specify our knowledge of neuro-anatomy and physiology?

For years it has been the tendency of our fellow practitioner to look askance upon our specialty of psychiatry and not infrequently question our own ergasiology. In light of research and better teaching of psychiatry to the medical student this has largely been overcome. May we foster and further enhance the idea that the psychiatric problem is a medical problem rather than push our specialty further back into the quagmire of mysticism and incredulity by too much super specificity as may result from too unsound and unbiologic an approach? After all, the mind has developed along with the body, and behavior must therefore depend upon certain physiologic structures and principles, rather than a maze of psychologic hypotheses that are as bizarre and illogical as is the behavior of the patient.

Dr. Young (closing).—Dr. Carroll Turner struck a very definite note when he spoke of the general practitioner. We were discussing at the lunch table today the teaching of psychobiology and psychiatry in medical schools. I think the thing psychiatry is trying to do today in medical schools is to teach the medical student how to get back to the attitude of the old general practitioner. The physician has tended to go far afield as the result of our instruments of precision and the many finer distinctions which have entered into the matter of diagnosis.

So, I should like to reduce all of our high-sounding phrases to this: first, that the individual physician should know more about humanity and should cooperate as an individual with other physicians with mutual understanding of viewpoints; and, second, should share this same cooperation with other disciplines. Carrying this further, I do not believe organized medicine would find itself in the position it is in today if in the past it had been willing to admit to its precincts such disciplines as sociology and social work, and other people who deal with the social structure and social aspects of our particular problems.

THE PHYSICAL REQUIREMENTS FOR ENTRANCE AND THE SUPERVISION OF THE HEALTH AND WELFARE OF STUDENTS DURING THE MEDICAL COURSE*

By H. D. Moor, M.D.†
Oklahoma City, Oklahoma

The above title involves a large variety of problems. It is so extensive that in the time allotted me the best I can hope to do is to briefly outline our own student health program. It is impossible to include a discussion of the problems concerning general welfare. I have included a detailed discussion of our tuberculosis program because of the recent general interest in this work among university students by health officials.

Prior to 1920 the University of Oklahoma had no official university physician. Dr. Gayfree Ellison, however, acted in that capacity and in 1920 was officially appointed. His duties were general for the whole university. There were no particular rules and regulations that applied to the medical school. No adequate medical or physical examination was required for admission. No requirement as to vaccinations was enforced. Medical students who became acutely ill were taken care of in the University Infirmary. No systematic attempt was made to discover chronic diseases and, if discovered, they were discovered accidentally. For example, an active case of tuberculosis was detected in a sophomore medical student in this way during the spring of 1922.

For a number of years back each student applying for admission to the medical school has been required to present a health certificate signed by a regular practicing physician in his home town. In our experience these certificates have been practically valueless. Specific vaccination against infectious diseases has been only generally advised since 1920 and required since 1933 in connection with students' work in bacteriology because of the danger in these courses of accidental infection.

In the fall of 1938, Dr. Robert U. Patterson, Dean of our school, outlined the following stu-

---

*Read in Section on Medical Education and Hospital Training, Southern Medical Association, Thirty-Third Annual Meeting, Memphis, Tennessee, November 21-24, 1939.

†Professor of Bacteriology, Chairman of the Committee on Student Health, University of Oklahoma School of Medicine.

dent health program for the University of Oklahoma School of Medicine:

(1) Each applicant is required to enclose with his application blank a special examination form filled out and signed by a regular practicing physician.

(2) The prospective freshman class is required to report to the medical school on a designated day during the week just prior to the opening of school. Dr. H. D. Collins, one of our clinical staff, is charged with the responsibility of forming a team of nine doctors consisting of specialists in the various fields of medicine and surgery to perform a thorough physical examination.

(3) The results of each examination are then compared with the report sent in by the applicant. From these data recommendations are made to the Chairman of the student health committee regarding their physical fitness for admission and suggestions for correction of defects.

In this year's class of freshman students the physical defect that had the highest incidence was in connection with vision. Seventeen per cent of the entering class of 65 students had imperfect vision. All of these have been properly fitted with glasses and the defects corrected. Some of these students had been originally properly fitted and others had never had their eye defects corrected because their glasses had been prescribed by others outside of the medical profession.

The most important service that the chairman of the student health service can render to students in any medical school is educational. The experienced physician knows that it is unwise for him to treat himself in case he is ill. It is sometimes quite difficult to convince medical students that they are not fully capable of treating themselves or their fellow students just as well as an experienced regular licensed physician. This is only the second year of an adequately established student health program in our school. We are still having some difficulty in impressing upon the students the necessity of reporting their illnesses to the proper authorities at once, without treatment by themselves or by anyone else that they might indiscriminately contact for medical advice.

(4) Vaccination against typhoid and successful vaccination against smallpox is now an admission requirement as is a blood test for specific infection. The tuberculin test is required during the first year in school and the Schick and Dick tests are carried out during their second year while taking the regular bacteriology course. In addition, all sophomores have their blood typed in the bacteriology laboratory. Careful records of all these procedures are kept in the files of the chairman of student health and copies are supplied for the Dean's file and for the files of the medical director at the University Hospital. Since the Bacteriology Department has been vaccinating against smallpox, typhoid and diphtheria, as well as making Schick, Dick and tuberculin tests, complete records of these procedures for the past seven years are in the files of the chairman of student health, with the exception of the tuberculin test; the latter test we have only done since 1934. A detailed report of this test appears later in this paper.

Since 1933 we have vaccinated a total of 436 students with antityphoid prophylactic. We have always used triple typhoid vaccine administered subcutaneously as recommended by the United States Public Health Service and the Army Medical School in Washington, D. C. We have vaccinated a total of 478 students for smallpox with the following results:

Immune reaction 412, vaccinoid 31, typical take 35, approximately 8 per cent susceptible.

The Schick test has been given to a total of 373 students. One hundred fifty of these gave a positive test. All of the positive reactors have been immunized with either toxin-antitoxin or alum precipitated toxoid. All students actively immunized are checked with the Schick test the following year in order to determine the effectiveness of the immunization. Among those actively immunized the process was successful in all but two cases out of the 150 students immunized.

The Dick test has been given to 339 students with 64 positive tests. No active immunization has been given the positive Dick reactors. This has not been done because only about 19 per cent have been found susceptible. Also because the length of time required to carry out the immunization is excessive in view of the fact that few are susceptible each year, and that relatively severe reactions may occur. Finally, we do not actively immunize because the type of scarlet fever occurring in Oklahoma is relatively mild. If a severe case should develop, an effective antitoxic serum is readily available. We have never to my knowledge had a case of scarlet fever among the students in our medical school. We think it is valuable to do the test, for a student who knows that he is susceptible to scarlet fever is more likely to take every precaution when exposed to a case of scarlet fever in his clinical work in the hospitals. The above discussion does not apply to children.

A total of 339 students have been typed to determine their blood group. The following results have been obtained:

Type I: 5 students, or 1.5 per cent.
Type II: 105 students, or 30.9 per cent.
Type III: 37 students, or 10.9 per cent.
Type IV: 192 students, or 56.7 per cent.

Blood typing is carried out in our course in serology as a routine laboratory exercise. It is valuable to the students to know their blood type, as this knowledge is advantageous in case they need a blood transfusion or in case they are called upon to act as a donor.

In addition to the physical and medical examination and the various specific vaccinations and tests outlined above, the chairman of the student health committee keeps daily office hours for consultation with students regarding their health. Careful records of these consultations are kept in the files of the chairman, and one is furnished the physician who takes charge of the students' illness. This record is kept as a supplement to the physical examination required for admission.

The second member of the student health committee is Dr. G. N. Barry, director of the outpatient department and in charge of admissions at the University Hospital. As our service is now set up, the chairman, after consulting with the student, fills out duplicate cards giving date, name of the student, class, and chief complaints. First aid treatment is given by the chairman in the Bacteriology Department. Frequently, this is all that is required, but if the student needs additional attention or hospitalization he is referred to Dr. Barry. In the event that it is clearly evident that the condition requires special treatment he is referred to the proper group of physicians or surgeons. In the absence of the chairman, the students are directed to report to the Dean's office in case of illness.

Students are always granted the privilege of selecting their own physician provided he or she is a regularly licensed practitioner of medicine. They are required to report to the chairman the name of the physician whom they select, and the chairman must keep in touch with the case. Absence from classes because of illness is excusable through a written excuse from the chairman to the head of the department concerned.

I have included in this paper a detailed report of our work in connection with tuberculosis because of the importance with which we are regarding this phase of our student health activities.

In 1934, Dr. L. J. Moorman, then Dean of the Medical School, started a survey of tuberculosis infection among the medical students. During that year, 63 students were tuberculin tested with Koch's old tuberculin. In this group 32 were positive, or 50.8 per cent. These positives were all x-rayed and given a careful clinical examination. The work started at that time was discontinued because of lack of funds. The Bacteriology Department continued the tuberculin test as a part of the class work. In the fall of 1937, Dean Patterson authorized the establishment of the work as a research project.

During the past two years 318 medical students and 150 University Hospital nurses were given the tuberculin test. The tuberculin used was the purified protein derivative (P.P.D.) tuberculin originally prepared by Long and Seibert, of the Henry Phipps Institute of the University of Pennsylvania. The tuberculin was administered by the intradermal method. The first strength test dose was 0.00002 mg. Those reacting negatively to the first test were given the second strength test dose of 0.005 mg. All doubtful reactions were considered positive and x-ray chest plates were made of each positive case.

Physical examinations were done by members of the clinical staff and results checked with the x-ray findings. Physical examinations have been done on all of the 214 positive reactors among medical students and nurses.

The results of the physical examinations to date have been essentially negative with the exception of five of the nurses. In their cases, no serious conditions were found at the time; however, we recommend that they be re-examined in a few months and that they take extra precautions regarding their health in the meantime.

The distribution by classes in the medical school was:

FIRST YEAR

No. Tested	No. Positive	Per Ct. Positive
53 seniors	34	64
52 juniors	25	48
55 sophomores	29	51
58 freshmen	23	38

SECOND YEAR

No. Retested	No. Positive	Per Ct. Positive
3 seniors	0	
1 junior	0	
35 sophomores	8	22.9
58 freshmen	35	60.3
3 graduate students	2	66.6

Among the 150 nurses tested during the two-year period, 39.4 per cent gave a positive tuberculin test. Among the total of 468 medical students and nurses tested during the past two years, 214 had a positive test, or approximately 46 per cent.

Six of the senior medical students gave a history of contact. Seven of the juniors, seven of the sophomores, three of the freshmen and thirteen of the nurses gave a history of contact. This gives a total of thirty-six with a history of contact. One hundred per cent of the contact group had a positive test.

The National Tuberculosis Association reports the incidence of positive tests among contacts of 20 years of age or older as 75 per cent based on 56,688 tests. Among a comparative group of non-contacts the incidence found by the National Tuberculosis Association was 55 per cent. Of the 468 individuals we tested, 180, or 38.4 per cent with a positive test gave a history of no contact with tuberculosis.

These figures are significant from an epidemiological point of view. The tuberculin test is now regarded as the best single test for the diagnosis of early tuberculosis. This test will be positive in practically all cases of tuberculosis irrespective of whether it is active or arrested except in a far advanced or generalized case. In these latter cases the massive infection has apparently desensitized the patient. In any event a positive tuberculin test is a positive diagnosis of tuberculosis in some form. There is no correlation between the severity or extent of the patient's reaction to the test and the extent or stage of the disease.

This fact was strikingly illustrated in connection with one of the University Hospital nurses. This young lady was given the tuberculin test March 4, and the second strength March 11. The initial first strength test dose of 0.00002 mg. of P. P. D. tuberculin resulted in a negative test. The second strength test dose of 0.005 mg. gave barely a one-plus positive test reaction locally. Her chest x-ray failed to show any active tuberculosis, revealing only a moderate hilar calcification. Three months later she suddenly developed a pneumonic type of tuberculosis which ran a very rapid course and terminated fatally.

This case should impress us with the importance of regarding the tuberculin test as significant diagnostically. It is true that in a great many instances a positive test indicates only an arrested or dormant form of the disease. However, it does mean that the bacillus tuberculosis is present somewhere in the body and may under suitable conditions become active. This individual is in a sense a healthy carrier of the disease much as a person may be a healthy carrier of other virulent pathogenic bacteria such as pneumococci, meningococci, streptococci, staphylococci and others and possibly the virus of poliomyelitis. While it is true that healthy carriers of pathogenic bacteria are potent sources of infectious and contagious disease, it is not true that a positive reactor to the tuberculin test is necessarily a transmitter of tuberculosis to those with whom they come in contact, because as has been pointed out, in the great majority of positive reactors the disease is arrested or dormant. It is, however, true that every individual with a positive tuberculin test has been exposed to a communicable case of tuberculosis and has become infected. Even a short visit to a neighbor or relative may suffice to set up a focus of tuberculosis in a susceptible individual.

Harrington and others have found this to be true. They also found that many of the persons with positive reactions, especially children, were in close association with individuals who had communicable tuberculosis which had never been diagnosed. They give this as one of the prime objects of the tuberculin test, to seek the source responsible for the disease and when found to stop any further exposure by isolating and treating these persons. We cannot do this part of the work alone. However, in cooperation with the State Health Department it could be carried out.

In connection with the importance of careful close medical observation of the positive reactors, the above authors report an incidence of active tuberculosis developing in 10 per cent of all positive reactors during a period of seventeen years. They also make the following interesting observation: one case of clinical tuberculosis in 2,000 or 3,000 positive tuberculin reactors among children (pre-high school age). High school age, one active case in every 500 or 800 positive reactors. In the twenties and thirties, one active case in every 100 or 200 positive reactors.

We had 158 positive reactors falling in the last age group. The x-ray plates were all negative for active tuberculosis; however, as previously noted, one developed a fatal case of tuberculosis about three months after the tuberculin test was performed, and one tested last year developed active tuberculosis this fall.

An individual with a positive tuberculin test is potentially tuberculous and should govern his life accordingly. His family physician should be consulted and he should be under constant medical supervision. As it is true that a person apparently in perfect health should have a careful medical examination at least once a year, then it is not unreasonable that a potentially tuberculous patient should be examined twice a year, including one x-ray chest plate.

Due to the fact that at the present time there is no effective vaccine or serum of any kind for tuberculosis, we must depend upon early diagnosis and isolation and treatment of the tuberculous population in our efforts to control the disease. As pointed out by Harrington *et al.*:

"The incidence of positive reactions to tuberculin among children and young adults is the best criterion of the tuberculosis problem in any community."

In conclusion, I wish to state that I believe Dean Patterson has set up a very adequate health program for our medical students under present conditions of the school. I should also like to say that I think Dr. Patterson is doing an excellent piece of work in his position as Dean of the School and Superintendent of the Hospitals, but I realize that there are certain conditions existing in our State over which he has no control and any criticisms that I may offer are made with that in mind; for example, I know that he realizes as we all do that our health program is sadly lacking from a recreational point of view. I feel also that dental and x-ray services to our medical students are not very satisfactory. These are features which we are striving to improve and I have an abiding faith that they will be improved.

When all is said and done, every phase of the medical school curriculum has its influence on student health. The underlying purpose of medical education is to protect, preserve and prolong human life as well as to alleviate human suffering. If we teach the medical students to safeguard their own lives properly and efficiently they will be better prepared to practice the profession to which they have dedicated their lives.

DISCUSSION (*Abstract*)

Dr. W. K. Keller, Louisville, Ky.—Having gotten the medical students in perfect physical condition and weeded out all those with chronic or acute illnesses, as I understood Dr. Moor, his chief difficulty with medical students is personality problems, the maladjustments. I should like to know what is being done in mental hygiene and preventive medicine along the line of his greatest problem, as I understood him to say it was.

Dr. Carlo Jos. Tripoli, New Orleans, La.—I should like to speak of the problem of pulmonary tuberculosis among medical students. Up to just recently, we have had five to ten medical students each year who developed active pulmonary tuberculosis, despite the fact that we run them through a routine, complete physical examination and check-up.

Regardless of how closely you examine the student, incipient tuberculosis in the early stage is not demonstrable by physical examination. At the present time, in accord with the surveys being made all over the country, it appears that routine examination by roentgenographic methods on all admissions to the medical school is in order. Some of the schools are doing the tuberculin test, but are not taking x-rays.

The problem of just tuberculin testing is really not sufficient. An x-ray of the chest in addition to tuberculin testing seems to be in accord with the programs that are being instituted in many schools.

Dr. Moor (*closing*).—I realize that an x ray is very important. As I said, the x-ray service is not very satisfactory because of great demands upon it with limited personnel, but I think we shall be able to improve the situation in the future.

Referring back to the young nurse who had miliary tuberculosis, all those with positive reaction have an x-ray of the chest. I feel that all of them should have an x-ray. I have recommended to the Dean that all students should have an x-ray of the chest. We have not been able to get money enough at $2.00 per plate to obtain the x-rays. I have firm faith that in the future we shall be able to obtain an x-ray on every student who is admitted to the medical school.

The young nurse whom I reported was very questionably positive. She gave a very slight reaction. I recorded her as a positive and got an x ray, but it was read as negative by the roentgenologist at the hospital, and I have a great deal of faith in him. The physical examination was negative, too, and all examinations except the tuberculin test failed to show she had tuberculosis. After she had been sick for some time it was found she had miliary tuberculosis. Then we had an x-ray, and it showed definite lesions; also a positive sputum was found.

I think it is very important that we have x-rays of the chests. However, many times the tuberculin test is positive with no physical or x-ray evidence of tuberculosis.

We refer the maladjusted to our psychiatric department. In some cases they succeed in adjusting themselves, as did the young lady I spoke of who went through two years. Now she is very well adjusted and is making good records. For the young man who became maladjusted during his senior year, there was nothing we could do at the time. The only thing that woke him up was that he "flunked." When he came back to school, he found he just had to do the required work in order to get through, and he went to work and did it. Sometimes you have to treat neurotic people rather sternly. I do not mean too sternly. I do not want to be unfair, but they think you are unfair to them, nevertheless. Be firm and let them know they are to learn to practice medicine, and if they do not do

the things they are supposed to do they are going to fail. They will get their passport out the door, and the portals of the medical school will be forever closed to them. We do refer them to the department of psychiatry, the neurologists, and so forth, however, and they are cooperating with us very well.

THE HOSPITAL'S RESPONSIBILITY FOR TRAINING OF INTERNS AND RESIDENTS*

By F. R. BRADLEY, M.D.†
St. Louis, Missouri

The distinguishing feature of a hospital is, of course, the medical care and nursing service which it provides for the patient. Of equal importance is the instruction of physicians, interns and medical students, nurses, dietitians, occupational therapists, social service workers and others, especially the public. The training of interns and residents is our subject today.

The medical school gives the student a basic preparation in medicine, but the art of medicine, together with the opportunity to obtain sufficient experience in diagnosis and treatment under supervision, must come at the bedside. It is of tremendous importance to the community that hospitals can take students recently graduated from medical school and, in three to six years, by furnishing them a thorough, well-rounded intern and resident service, train these young physicians so they can take their places in the community as men of good judgment, possessing a reasonable degree of technical skill.

What is meant by a thorough, well-rounded resident service is a period of special training that shall be of such character that the relation of anatomy, physiology, pathology, bacteriology and biochemistry is emphasized. Knowledge of these sciences as applied to clinical surgery will be required on the examination of candidates for the various American boards, combined with adequate experience in clinical training and treatment in which the resident has assumed the whole responsibility of the care of the patient. A statement of the "Fundamental Principles for Graduate Training for General Surgery and the Surgical Specialties," as laid down by the American College of Surgeons in the October, 1939, bulletin is of interest.

THE HOSPITAL

The hospital should provide:

(1-a) A well organized medical staff with department chiefs or heads who are responsible for the organization and operation of the graduate training program.

(b) Assigned personnel, responsible for active and personal supervision and direction of the resident staff.

(2-a) Departmental conferences in general surgery and the surgical specialties at least weekly in which the resident should be permitted and encouraged to take an active part.

(b) An active surgical service with a sufficient number of patients to offer opportunity for study and experience in the diagnosis and treatment of a variety of surgical conditions.

(c) An outpatient department with systematic follow-up clinics in which the resident, under proper supervision, may spend definite time.

(3-a) Adequate clinical laboratory and x-ray facilities under the full-time supervision of an approved or accredited pathologist and radiologist, respectively, with qualified technical assistants.

(b) Other adjunct diagnostic and therapeutic facilities now considered essential for diagnosis and treatment.

(c) Weekly clinicopathological conferences for the demonstration and study of surgical and postmortem pathology.

(d) Affiliation where necessary with other educational institutions to offer the resident staff opportunity for collateral basic science study and study on the cadaver or animals.

(4) A medical library containing a wide range of standard textbooks, current medical journals and periodicals.

THE RESIDENT STAFF

It is desirable that the resident staff should:

(1-a) Devote adequate time to the study of gross and microscopic surgical pathology, clinical roentgenology and radiology, and the auxiliary basic sciences.

(b) Observe and participate in autopsies on patients who have died postoperatively or on the surgical service, and study the findings in correlation with the clinical history and course.

*Read in Section on Medical Education and Hospital Training, Southern Medical Association, Thirty-Third Annual Meeting, Memphis, Tennessee, November 21-24, 1939.

†Superintendent, Barnes Hospital, Teaching Facility of Washington University School of Medicine.

(c) Supplement clinical knowledge by anatomical dissections, study on the cadaver and animals, and/or other basic science study.

(d) Participate in clinical or experimental research.

(2-a) Obtain sufficient operative experience under supervision to provide a reasonable degree of technical efficiency.

(b) Devote an assigned period of time to diagnostic and follow-up work in hospitals with an outpatient department.

(3) Participate in medical staff and clinicopathologic conferences, and in the departmental meetings.

(4) Be responsible for some teaching activities, such as educational programs for student and graduate nurses, and other groups.

(5) Devote as much time as possible to reading of scientific literature, past and current, under specific suggestion and supervision of preceptors.

REPORTS OF PROGRESS

(1) Records of the work of the resident surgical staff should be kept by the hospital, and such other records as may be necessary to insure an equitable distribution of work, and to provide a basis for evaluating the scope of training.

The reputation of a hospital depends in a large measure upon the quality of the house staff, and a physician is very apt to take his patients to the hospital that possesses the best intern and resident staff. The services which the practicing physician expects to have done for him by the interns are many and varied. They range all the way from the simple order of routine work during the physician's examination to assisting in treatment and operation, and in some instances when the physician is out of town, the well-trained intern can care for the physician's private practice until he returns. The realization on the part of the physician, and the service which he receives and requests, vary as widely as his knowledge of what good intern service shall be. By that we mean that we should be aware that a bright, energetic intern will not only save us much valuable time, but that the intern is, aside from the work he may do for the physician, a mental stimulus of the best type. The doctor and the intern supplement each other in many ways, the most obvious one being that the intern brings freshness of viewpoint, more recent scientific information and technic, to supplement the clinical experience of the practitioner. How many of us who graduated only recently can still do a sugar tolerance test, fractional urine, prothombin for bleeding time or clotting time unless we are actively engaged as teachers in the specialty of clinical microscopy? However, the recent graduate from medical school can do these tests under the supervision of the senior interns, and not only can do it, but will do so gladly with a considerable saving to the hospital and much improved service to the patient. It is especially valuable to have interns who can and will do laboratory work after the hours of 6:00 p. m. and before 7:00 a. m. when the regular laboratories are closed and the technicians are not present.

Internship is a mutual affair necessitating the highest degree of intelligence and cooperation between the physician, the intern and the hospital departments. It is truly a difficult thing to take a man who has just been given the degree of a doctor of medicine and yet impose upon him rules and regulations which are as stringent and exact as those imposed upon the student nurse. Too often a superintendent of nurses or a nursing supervisor will take the opportunity to embarrass a new intern, in fact, a resident, if it can be gotten away with, excusing the action on the ground that the young cubs need discipline. But if we analyze the action, it is just being mean.

One of the pitfalls which often besets the quality of the intern service comes from our attitude. We who are prone to overlook the value to ourselves of teaching, and in our hurry to treat as many private patients as possible, we are apt to want to select our assistants from fellow practitioners and bring them into the hospital instead of using the resident house staff. This not only works a hardship on us, but prevents the intern from receiving training through actual experience with the attending physician. It is logical that the patient may not receive the best hospital care, and we should be on our guard against this very thing.

DISCUSSION (*Abstract*)

Dr. Carlo Jos. Tripoli, New Orleans, La.—For the last several years down in Charity Hospital we have had two problems. One is holding conferences with interns and giving them the necessary practical training by members of the staff. As it started off, everybody was enthusiastic about it and it went off very nicely. Then there were complaints that the interns were not coming to the seminars and the conferences, and would not come. Their excuse was that they were too busy working on the wards, that they had completed

six years of didactic teaching and they wanted to learn how to practice medicine, to listen to the patient's chest, and so forth. The thing gradually tapered off into nothing's being done again.

For the boys going out into practice, one year of internship is not enough. We thought they ought to have certain training, despite the fact that they did not want it. When these men came up for residencies they found 50 per cent of their examinations by qualifying boards were on fundamental subjects and not on how to treat the patient.

Then the question came up, since the hospital cannot require the men to take this work, and has no real control over them to force them to take it, why not put it under the supervision of the university where the university is available to the medical school? The university uses its staff as a sort of graduate training projected into the hospital, not necessarily by the hospital staff, but by the university staff projected into the hospital as graduate training given by the university.

The same question comes again that it is not the university's responsibility to teach the interns in the hospital or the residents, but the hospital's responsibility to teach the interns and the residents. Since the university has no control over the interns and the residents, the university cannot compel them to go to school unless the residents register in the graduate school, if any, of the university, and therein spend four years to take their degree.

It would seem at the present time that the only solution we have to our problem is to make the residents, who are qualifying for the board, register in the university, take the necessary time required by the qualification board in the hospital as training, get their training by the university staff, and spend the extra year necessary to get their master's degree in their subject.

Dr. Stuart P. Cromer, Little Rock, Ark.—Having inspected some 250 of these institutions in the last one and one-half or two years, I should like to emphasize again a number of points brought out.

The education of interns and residents is the responsibility of the hospital. These boys are not being paid for the work they do for the hospital, except by the education which they receive.

I should like to offer a word of caution about delegating too much responsibility to the resident and to the intern. Of course, that should be done as far as the man is capable of accepting it. Essentially as concerns the residency there must be a preceptorship type of training. Certainly that means, even though he has full responsibility in the sense you are speaking of, it must be under supervision at all times.

There are many hospitals where the interns assist the residents and the residents assume the full responsibility of everything that is done in the hospital on certain days. Training of this type is of questionable value. Unless either a formal or an informal educational program is provided by the hospital, we wonder if they are giving in compensation for the services they are receiving.

There are more interns demanded by the various hospitals of the country than there are graduates to fill those positions. It is not possible for every hospital to supply the full quota of interns and residents that would be theoretically desirable. I wonder, then, in these institutions that have not their full quota, if the hospital does not owe to that house staff the responsibility of providing training either formal or informal, in spite of the amount of work that goes on there. If there is too much work for the house staff to handle, they should compensate by hiring house physicians whose compensation is not training.

Dr. Isidore Cohn, New Orleans, La.—There are two things which Dr. Bradley said that impressed me particularly and with which I should like to take definite exception. One is that the resident staff should have entire control of the patient, and the other is that the reputation of an institution is dependent on its resident staff.

I was trained in the Touro Infirmary under Dr. Matas. Everybody trained in New Orleans, whatever he is or whatever he expects to be, and whatever his institution, reflects the glory of a few men, and particularly that man who stands at the summit of all of them, Rudolph Matas. Without Matas and men of that type, all of the opportunities to operate might have made operators instead of surgeons of us.

One of my own teachers, the late Dr. Edmond Souchon, used to say there are two classes of surgeons: the cut and tie surgeons, and the tie and cut surgeons. The cut and tie surgeon cuts and then ties; if it bleeds, he ties it. The tie and cut surgeon knows where it is, ties it, and then cuts it. All are agreed that the cut and tie surgeon is dangerous.

If it were not true that the American Board of Surgery and the American College of Surgeons realized the importance of the preceptorship principle, we should not have these requirements which Dr. Bradley was good enough to throw on the screen as having come from MacEachern.

One of the best institutions, I believe, for graduate training in this country is the Packard Hospital over in Sayre, Pennsylvania. There, I believe, everything is under supervision.

I believe we have to keep in mind that our responsibility is primarily to the patient, and Dr. Finney, in his remarkable essay many years ago, said our responsibility consists in saving the hundredth man. Some of you remember that splendid essay of his. We must not think of the patient as a pawn to be used for the gratification of a young man in his training. We must remember that we are dealing with that which cannot be re-created by the hand of man, and in approaching our responsibility as surgeons we should approach the most glorious of all the work of the Divine Creator of the world with that in mind.

Therefore, I say I believe it is our job to remember, as members of our staff, that we should continue to be teachers, and let us make a very definite distinction between teachers and professors. Some professors, not all, are men who are paid to do a job. Teachers are men who love to impart whatever knowledge they have to their younger colleagues along the line of the Hippocratic oath.

I do not believe the staff is doing its duty toward the residents unless their work is supervised. The three years which they have, or the four or five, no matter how much experience we give them in that period, cannot be a substitute for the surgical judgment which cannot be learned except by supervision, preceptorship or by the trial-and-error method. Let us hope that the time is past in our scheme when the trial-and-error

method will continue to work. If we assume that the young men get their training by having complete control of patients without the staff, then I believe we are going back to the trial-and-error method and we will not be saving the hundredth man.

I do not believe Dr. Bradley meant to convey the idea that he believes in unsupervised resident control of patients.

Dr. Bradley (closing).—I hesitated to show these requirements because they are difficult to attain, and because they do not apply to the smaller hospitals and the general hospitals out in the country which are doing the major part of our medical service to the community. It is a special problem which I think will have to be worked out through the years.

We have two ways for working this out at Barnes Hospital. One is that the resident knows he is going to be a candidate for the American Board, and he gets himself in readiness to take the special subjects and, inasmuch as we are a teaching hospital, it is a little easier. But we meet the same difficulties you mentioned. One is that the intern says he has not time. It is the hospital's responsibility to furnish an adequate number of interns, so that the intern can be free for conference. For instance, on Thursday morning the hospital should have a sufficient number of interns so that one man can be detached for emergency service in the hospital. There is always a practitioner who is going to operate, with some intern to assist him at the operation, which will release the other men so that they have no excuse and do not feel that they are slighting the patients or their work.

The other way of meeting these requirements is to have in the university a postgraduate course. In ophthalmology and otolaryngology, men who have been out in practice come back and pay some $600 or $800 for a nine months' basic course, and then come into the hospital. We do not call them interns because they must have had an internship before we take them. They are made residents, and it is entirely up to them. They are paying good money for it, and the first nine months they get a well-rounded course in basic sciences in the university. That is another approach. Just what is going to be worked out will be very interesting.

I think, perhaps, what we shall have in this country will be similar to what we have in nursing education. We have the three-year nurses and we have the five-year nurses. The five-year nurses have the B.S. degree and presumably are going to be teachers and nurse executives, while those who take the three-year course do nursing. It may be that you will strike a level for residencies where a man can get his residency and not be certified in any one of the American boards. He goes out into practice, and the pinch will determine whether or not he can come back and get his certification.

It is a large problem, and I do not want to obscure the fact that we must give all our interns and residents sufficient clinical experience so that they will have a reasonable degree of skill as physicians when they go out, so that we shall not be forcing on the community untrained men. That is really the theme I wanted to get across today. I put in the American Board because it happened to be available and something new.

I had no intention of leaving the impression that supervision ever ceases as long as the resident is in the hospital. A hospital is the long arm of the doctor. The prime objective is the care of the patient and the entire staff is selected, first, for the care of the patient; second, to assist the attending staff; and third, and growing out of that, is the instruction which the intern receives.

The reason I put emphasis upon assuming full responsibility, which you gentlemen have qualified and with which I heartily agree, is that we do not turn loose a man after three, four or five years who thinks he is competent to go out unless we have given him that training under supervision.

What I mean by assuming full responsibility in our hospitals is this: the resident sees a man with an acute abdomen. He has his assistant resident and his intern, and perhaps a medical student. They examine the man and evaluate the clinical findings; secondly, the x-ray and the laboratory. If the clinical findings do not agree with the laboratory or with the x-ray the clinical findings stand. Then, if it is at night, the resident calls up the professor of surgery or whomever the professor of surgery assigns, and says: "I have a man here with an acute abdomen. His white count is this, the urine is this, I have excluded this—what shall I do?" The surgeon mulls it over and says: "I am coming over," or "Go ahead. I think the diagnosis is thus-and-so. You start and I will come over," or "You take full responsibility."

PUBLICITY'S PLACE IN THE PUBLIC HEALTH PROGRAM*

By JOHN M. GIBSON, A.B., B. LITT.
Montgomery, Alabama

On an historic Sunday morning several weeks ago a lean, angular English gentleman sat before a microphone in London and, in a voice that betrayed the strain under which he spoke, told an anxious world that the new World War, so long feared and so often postponed, had come at last.

Almost breathless with fearful anticipation, people in every quarter of the globe waited for news of battles, in the air, on land and at sea. The mass bombing of London, Paris and Berlin was expected momentarily. And then came a surprise. On the first day of this second World War, a squadron of British planes took to the air and winged their way across the Rhine. But they carried no bombs. They carried, instead, propaganda leaflets. These they dropped, millions of them, the newspapers said, over a wide area of the enemy country. Meanwhile the ether waves were thick with appeals from both sides, each stating its case and defending its position

*Read in Section on Public Health, Southern Medical Association, Thirty-Third Annual Meeting, Memphis, Tennessee, November 21-24, 1939.

in the conflict, while people waited in vain for the expected battle of battles. Its failure to materialize led to the dubbing of the struggle as "a phony war."

But these modern war makers are wise. For they know that there is a force more powerful than the heaviest artillery, the hunger war of blockade, the silver bullets of economic power, and the diplomatic warfare of alliances and pacts. It is more powerful than all these because it makes all these possible. I refer to what the editor of the *New York Times,* commenting upon the British leaflet propaganda raid, called "the mastery of the human mind" and what Thomas Jefferson, in the Declaration of Independence, called "the opinions of mankind." The rest of us know it by its more prosaic term, public opinion.

Innumerable wars have demonstrated how great this weapon of public opinion can be in the work of mass murder and devastation. Fortunately, however, all its power does not lie in that direction. It can be used to bind up nations' wounds after bitter conflict. It can be enlisted to further philanthropic causes. It can be employed in the effort to make men and women lead better, more moral lives. It can be, and often is, used to break up the unholy alliance between crime and politics and to send criminal politicians to jail. It can be used to give a crippled child a chance at the better things of life. It can be used to give a thousand communities better schools, better homes, and a higher sense of civic responsibility. And it can bring vastly better health to men, women and children everywhere.

It is as an agency for better health conditions that we are particularly interested in an informed public opinion at this time. In order to harness that powerful force and make it serve the cause of healthful living, a number of public health agencies have undertaken programs of public health education. Included among them is the Alabama State Department of Health.

In speaking of our work in Alabama, I do so, not because we in that State consider it exceptional or worthy to serve as a model for other health groups, but because we feel that the problems which face us in this field are problems which are more or less common to state health departments in the South and because it is our hope that our experience has yielded fruits which may prove helpful to some of Alabama's sister states in their present or projected public health education programs.

Although the Division of Public Health Education cooperates fully with other agencies that emphasize other types of public health education, the Division's own program is devoted mainly to health publicity through the well established publicity media, rather than through the use of posters, displays and platform lectures. The publicity media to which I refer are, of course, the press and the radio.

On an average business day the Director of the Division of Public Health Education, the present speaker, prepares, from material gathered here and there, from one to half a dozen releases. The original of each release is carefully checked for accuracy and then typewritten copies, two originals and three carbons, are made available simultaneously to the two Montgomery dailies, the Associated Press, the United Press, and International News Service. A sixth copy is kept for our records, of course.

You may have noticed that I used the word *releases,* not reports, statements, tables, or anything like that. Every piece of material issued for publication is written just as if it had been turned out by a reporter for the newspaper using it. By doing that we serve both the newspapers and ourselves. We assist them by saving them, their reporters and rewrite men, the trouble of actually writing the health material they use. On the other hand, by saving them that trouble, we naturally have more stories published than otherwise would be the case. For another thing, we avoid the danger that a reporter, covering a wide territory and lacking more than a general knowledge of health matters, will unintentionally write stories that are not factually correct. For still another thing, this method enables us to get across to the newspaper-reading public the particular aspects of a question which we wish to receive publicity. If, for instance, the health department should merely prepare and issue a statement, it would have no say-so as to what parts would be "played up" and what interpretation would be placed upon the statement as a whole. However, when the story that is to be used in the newspaper is actually written by a member of the state health department staff and from the health department's point of view, the position of honor, that is to say, the opening paragraphs on which the headlines will be based, can be given to those parts of the message which the

department particularly desires to reach the public.

Last year we issued, in the manner described, 463 daily releases, an average of about two every business day, with proper allowance for holidays, vacations and other absences. All but a very few of these were published in one or both of the Montgomery dailies, and our 1938 scrapbook, composed of clippings from these two papers alone, contains slightly more than 550 different items. Naturally, these cover practically the entire field of health, alphabetically from accidents to x-rays and medically from dentistry to diabetes. We have no records covering the use of our releases in newspapers published outside the capital city, but are well pleased with the use made of them in those publications.

In addition to our daily releases, essentially of a news character, we prepare for the Associated Press every week a brief discussion of some phase of health. This is syndicated to A.P. newspapers in various parts of the State. This, incidentally, is the only exception to our rule that all of our material of this nature must be made available simultaneously to Montgomery's two daily papers and the three news agencies receiving our releases. Twenty-three of these "State Health Chats" were reprinted as a booklet some time ago for general distribution. The first supply of these booklets was soon exhausted and a second supply was ordered.

In addition to our daily typewritten releases, which last year reached an aggregate wordage greater than that of a larger-than-usual novel, we issue every week a special release in mimeograph form to all the State's 145 weekly papers. These are also sent to the 20 daily papers outside Montgomery, supplementing the State Health Department material they receive through the Associated Press, the United Press and International News Service. These releases are essentially similar to those issued daily, except that, in view of the fact that several days must elapse between their preparation and publication, we must be careful to see that this delay does not affect their news value.

Although opinion varies widely as to the number of persons reached by the average radio program, there is general agreement that the radio is one of the most potent agencies for the dissemination of information ever placed at the command of the human race. For that reason, the writing of scripts for the weekly broadcasts, "Health Is Wealth," and for special broadcasts from time to time, is an important function of the Division of Public Health Education. It is estimated that our broadcasts can be heard in nearly 46,000 Alabama homes, thus reaching a potential audience estimated at 183,900, or more than the 1930 population of any city in Tennessee except Memphis and more than the present estimated population of any two cities in Alabama, exclusive of Birmingham. How large a percentage of this potential audience comprises our actual audience we can only conjecture.

We all know how easy it is to tune out a program in which we are not interested. Neither the courtesy due a public speaker, the embarrassment of walking out of a crowded hall, nor any other inhibiting factor operates to make us listen to a particular station a single minute after its program ceases to interest or amuse us, and for that we, as listeners, are often profoundly grateful. But, as those whose job it is to get our messages over to as many listeners as possible, we sometimes wish this were not true, that we could employ the same restraints that work to the advantage of the speaker addressing his audience face to face. Our primary objective, of course, is to overcome this handicap by making people willing to listen to our programs.

I once knew a successful soft drink bottler in Brooklyn, who used to say: "Whenever your bottling plant smells like a bottling plant, it's time to clean it up." That gentleman's observation might be paraphrased to say: "Whenever your health talk sounds very much like a health talk, you'd better rewrite it."

How can a radio health talk be prevented from sounding like a radio health talk? There you have a problem indeed. It is one which probably cannot be solved completely, for a health talk is a health talk until it becomes something else. And when it becomes something else, it fails to do what it is expected to do. However, we believe it is possible for a health talk to remain a health talk and perform the service a health talk is supposed to perform without sounding like a health talk.

We try to give our hearers something they will listen to rather than assume the attitude of a doctor giving castor oil to a rebellious child. We avoid technical terms and unfamiliar, even though non-technical, words. Our illustrations, and we use as many of them as we can, are drawn whenever possible from the down-to-earth experience of ordinary men and women. We avoid "talking down" to our hearers. We try to keep them from feeling that they are being "educated." We do not hesitate to use statis-

tics, but we try to use them in terms of human interest so that they may be understood and remembered by the man in the street. We do not try to compete with humorists in their chosen field. We try to keep in mind at all times that not one person out of one hundred who may be listening to us is a medical man. So we approach our subjects in the manner of *Hygeia* rather than that of the *Journal of the American Medical Association.*

The Duke of Wellington once met a British officer wearing a dilapidated, tattered service uniform and looking pretty bedraggled generally. Upon being chided for his appearance, he tried to excuse himself by replying that he was off duty. Thereupon the Iron Duke countered: "Sir, a British officer is never off duty."

Nor is the public health education worker, like any other writer, ever off duty. The physician spends much time reading his medical journals, and properly so. But the reading he does is little indeed compared with that which should be done by the physician whose medicine case is a typewriter and whose stethoscope is a mimeograph machine. He should read good writing to improve his own. But, even more important, he should read and read and read, on Sundays, holidays and at all times when not otherwise engaged, to add to his general knowledge and to collect clippings to be filed away for future use. And when he is not reading, he should be listening and observing. A chance remark of a friend around the dinner table. The homely philosophy of a negro janitor. An anecdote selected by a minister to drive home the point of a Sunday morning sermon. The lecture one attends for general cultural improvement. Even personal letters from one's friends. All these and many others, having on the surface not the remotest connection with health, can be used to prevent a radio health talk from sounding too much like a radio health talk.

We do not consider that a radio talk has by any means exhausted its usefulness when the speaker leaves the microphone. Each one is mimeographed, and a copy is mailed to every county health officer. Other copies are sent to bureau and division heads and to a list of people here and there in and outside the State who have asked to receive them regularly. Copies are also kept in our files for filling requests for material for school themes, club papers, feature articles, and so on. Occasionally newspaper editors ask permission to print them, or, more often, print them without asking permission. At present 225 copies are being made of each radio talk delivered.

Is there a real need for public health education? Has it a real place in a public health program?

The present speaker tried to give a partial and more or less indirect answer to these questions in an article published under his by-line in the March, 1939, issue of *Good Housekeeping.* Calling attention to the alarming increase in the prevalence and killing power of the so-called degenerative diseases, in the face of gratifying reductions in the death rates for tuberculosis and many other infectious diseases, this article urged upon the magazine's readers a realization of the need for greater attention to health and the development among the supposedly well of personal habits conducive to physical well-being and long, useful lives. Referring specifically to the need for more rest as the best preventive of these newly crowned kings of killers, the article concluded as follows:

> "Thus the responsibility for the mounting deaths and disability due to the strain of modern living rests, not upon the medical profession, but upon plain, ordinary men and women. Whatever progress is made in checking this trend must be made by those individualistic individuals of strong wills and backbones who are determined to get the rest they need, regardless of the difficulties in the way."

The habits to which the article referred, habits which are society's first line of defense against these greatest of killers and against bad health generally, are not developed in haphazard, willy-nilly fashion. They are the fruits of a firm, deep-rooted conviction that they are necessary if human health and human life are to be made safer. Moreover, they are essentially the fruits of widespread health intelligence and health knowledge. The public health agencies have a heavy responsibility in their development. Public health education must lead the way.

Southern Medical Journal
JOURNAL OF THE
SOUTHERN MEDICAL ASSOCIATION

Copyright, Southern Medical Association, 1940. Published monthly by the Southern Medical Association, Empire Building, Birmingham, Alabama. Annual subscription, $4.00. Single copies, 35c each.

Entered as second-class matter at the Post Office at Birmingham, Alabama, under Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917, authorized December 20, 1921

M. Y. DABNEY, M.D., Editor
EUGENIA B. DABNEY, M.S., Associate Editor
C. P. LORANZ, Secretary, Treasurer and General Manager

Volume 33 SEPTEMBER 1940 Number 9

EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
Thirty-Fourth Annual Meeting
Louisville, Kentucky, November 12-15, 1940

THE LOUISVILLE MEETING

The host in 1920, 1930 and again in 1940, Louisville seemingly prefers to entertain the Southern Medical Association regularly on each census year. Possibly the years are a coincidence, but the methodical and regal way in which the Louisville profession has carried out these past meetings is assurance that another good convention is in store for members and guests of the Association on November 12-15.

From the State of Kentucky, already wealthy in its medical heritage, may be expected the traditional hospitality of the old South, in that the profession of Louisville and the state at large are eager to see that each visitor returns home contented with his trip.

LOUISVILLE

Situated just 90 miles from the exact center of population in the United States, Louisville is one of the most accessible cities in the territory of the Association, whatever the mode of transportation. Eight trunk line railroads radiating in all directions, a magnificent highway system and important air lines make it a natural hub from the most remote points in the Southern states.

Louisville and surrounding Kentucky country present a bonanza to those interested in historical attractions. Famous Churchill Downs, where the Nation's annual classic, the Derby, is run in early May, the near-by Old Kentucky Home of Stephen Foster, the Lincoln Shrine, St. Joseph's Church in neighboring Bardstown where are kept a group of old masters' paintings, a gift of Louis Philippe, once exiled king of France, who spent a portion of his exile in Kentucky, and the natural wonder, Mammoth Cave, all contribute to make a trip to Louisville and Kentucky a cherished memory. By physicians and the wives of physicians the names of Jane Todd Crawford and the surgeon, Ephraim McDowell, will always be revered. Today a highway bearing her name commemorates the sixty-mile ride on horseback that this pioneer heroine made to undergo the world-renowned operation of oophorectomy. At Fort Knox, a short drive from Louisville, is the most talked of hole in the ground in the world; for here is the United States Gold Depository, where are stored several billions of dollars in gold.

Louisville had its beginning when George Rogers Clark, with his small band of militia, halted at the falls of the Ohio on the way to conquests of the British outposts in Illinois. It is only fitting that this hero's final resting place is at Cave Hill Cemetery. Louisville was officially chartered by the Virginia Legislature in 1779, when the city was still a part of Virginia, and the growth of this metropolis, despite disaster created by the rampant Ohio, is a tribute to its people.

PROGRAM

In general, the program for the Louisville meeting will follow the plan in effect at several recent meetings. Tuesday will be Louisville Day, a program of short clinical presentations by physicians of Louisville. On Wednesday morning, the General Clinical Session, a program arranged and conducted by the President, will be presented. From Wednesday through Friday the nineteen sections of the Association and the three conjoint meetings will be in session.

On Wednesday evening, as a feature of the General Session, Dr. Arthur T. McCormack, President of the Association, will deliver his presidential address, this to be followed by the President's reception and ball.

Fraternity luncheons and alumni reunions will, as in the past, be held at noon and evening, respectively, on Thursday. A session which is open to the public will take place on Tuesday evening

and addresses by three of the Nation's outstanding medical men will be given.

Programs, both general and sectional, are rapidly nearing completion and, judging from the quality of speakers chosen, there may be expected one of the most timely and stimulating meetings the Association has had.

EXHIBITS

From a check of scientific exhibit applications now on hand, a good variety of displays is assured. There remains a limited amount of space so that any member of the Southern Medical Association who wishes to present an exhibit should write to Dr. W. O. Johnson, 908 Brown Building, Louisville, Kentucky, Chairman of Scientific Exhibits Committee, or to the Association office, Birmingham.

The technical or commercial exhibits will be governed by the policy in force at the Memphis meeting. The commercial exhibits are dignified by the elimination of souvenir collecting, the limiting of sample giving, and the abolition of high-pressure selling, which have met with the enthusiastic acceptance of a large majority of physicians and most of the commercial houses. In fairness to all exhibiting firms, and for his own great edification, every physician who attends the Louisville meeting should spend time with the exhibitors. The commercial houses will strive to make all interviews enlightening by demonstrating rather than attempting to sell.

HOBBIES

The Association is this year introducing a Hobby Exhibit, a display of hobbies of physicians of the South. Applications so far received offer hobbies dealing with paintings, pen and pencil sketches, photography, stamps and coin collections, sculpture, and so on. Physicians with hobbies to present should write Dr. Jesshill Love, Chairman of Hobbies Committee, 1010 Brown Building, Louisville, Kentucky, or to the Association office, Birmingham.

HOTEL ACCOMMODATIONS

Because of an unprecedented demand for hotel accommodations, Louisville's two larger hotels, the Brown and the Kentucky, have no more rooms available on the dates of the meeting, November 12-15. Several smaller good hotels have a number of rooms not yet reserved, and it is suggested that those who intend to attend the meeting write at once for accommodations. All inquiries should be addressed to Hotel Committee, Southern Medical Association, Room 413, 421 West Market Street, Louisville, Kentucky. Be sure to state in your inquiry the price and type of accommodations desired.

MEETING FACILITIES

Registration, all exhibits, both technical and scientific, motion picture rooms, and some meeting rooms will be located in the Jefferson County Armory. Some meetings may be held in the Kentucky Hotel, one block from the Armory. All of the downtown hotels are within easy walking distance from the Armory.

HUGH YOUNG

To an editor's desk each year come various medical biographies, but few of the supreme excellence of Cushing's "The Life of Sir William Osler" or Heiser's "An American Doctor's Odyssey." While it lacks the full literary charm of the former, another book deserves a place beside them, "Hugh Young,"* the autobiography of Hugh Hampton Young, Professor of Urology, perhaps the most outstanding faculty member today of the Johns Hopkins Medical School, and Director of the James Buchanan Brady Urological Institute, Baltimore.

The acknowledged Nestor of urology in America, if not in the world, Dr. Young is the idol of urologists everywhere. When he enters one of their meetings, unfortunate is the speaker who chances to be presenting a paper, for a rising acclamation is apt to herald Young's approach; all eyes turn toward him, follow him to his seat, note his handshaking with all in reach; and throughout the hall there is a general buzz of excitement: "There goes Hugh Young!" The tones denote admiration, respect and love. Thus they acclaim their uncrowned king.

The book charmingly gives a brief word about his immediate family and forebears, his early colt roping days at his Texas ranch home, his education that culminated in the degrees of B.A., M.A., and M.D., in the previously unheard of span of four years at the University of Virginia, his temptations to become a newspaper man and later a civil engineer, his finally successful efforts to attach himself to the Department of Surgery of William S. Halsted at the newly established Johns Hopkins Hospital, an attack of pleurisy that took him to Mexico where he and a companion collected $5,000.00 in two weeks in

*Young, H. H.: Hugh Young, A Surgeon's Autobiography. New York: Harcourt, Brace & Company, 1940.

surgical fees, and his conscription from general surgery by Halsted to build up a department of urology which gave him his great opportunity, the results of which are only too well known.

His reminiscences of "the four horsemen," Welch, Osler, Halsted and Kelly, and the early days of the Hopkins Hospital are a description of the renaissance of American medical teaching.

A considerable portion of the book tells in language and drawings intelligible even to the laity, the successive contributions he made to urology and his establishment of the Brady Urological Institute.

The section on his work as Director of Venereal Disease Control of the A. E. F. furnishes an amazing story of further accomplishment, in that the incidence of venereal disease in the American forces was reduced below that of any of the Allies, and in fact below that of any army in history up to that time.

Adventure, descriptions of celebrities and places make entertaining reading. Anecdotes there are by the score, for the most part highly amusing while others are merely urologic.

While no autobiography is ever complete, it always becomes the very heart of subsequent biographies of a great man. Omissions usually are both intentional and unintentional.

It is always interesting to note the relative value which a man attaches to his own endeavors. For instance, George Eliot always considered herself a poet. And Hugh Young points with pride to the feeble flash in the pan made by mercurochrome, while the world will always be indebted to him particularly for such contributions as his technic in catheterization, his perineal prostatectomy, and his resection for carcinoma of the prostate.

In this first edition the book suggests some haste in the preparation of the latter portion, and somewhat poor editing throughout, all of which will doubtless be corrected in subsequent editions.

This autobiography of one of the greatest pioneers of modern urology, a master builder of his specialty, a stimulating teacher of rare capacity, a surgeon original, resourceful and deft, whose personality wins all who come within his range, should become the most widely read biography of the year and a best seller.

The reviewer stayed up with it till 2:30 a.m. without regret.

POLIOMYELITIS IN FECES

The virus of infantile paralysis has been detected in human feces, both in cases of poliomyelitis and in healthy persons. The demonstration is of course complicated by the fact that feces contain a very large number of micro-organisms of many varieties, which may cause confusing symptoms. Attempts to destroy the contaminating bacteria also are apt to injure the virus. To test for polio, an animal, usually a monkey, must be inoculated with the suspected material, and the monkey may be made ill very quickly by the injection of the countless non-paralyzing organisms always present in fecal matter.

Howe and Bodian[1] have simplified the technic of examining feces for polio by omitting all attempts to remove contaminating organisms and inoculating a lightly washed suspension of feces in distilled water intranasally into the monkey. By the intranasal route, the monkey is apparently more susceptible to poliomyelitis than to the numerous streptococci or other infectious organisms to which he is exposed. Contaminating bacteria caused few symptoms, but paralysis developed following 70 per cent of inoculations from known cases of human poliomyelitis. This route of inoculation should somewhat further simplify the search for poliomyelitis in feces of normal persons, and thus the detection of carriers.

The fact that poliomyelitis may be apparently readily contracted by the intranasal route from feces further emphasizes the possibility that the disease is filth-borne and transmissible, like typhoid, by the housefly.

DETERMINING VIABILITY OF THE FETUS

The diagnosis of fetal death remains difficult at times despite the many advances in methods of prenatal examination. The Aschheim-Zondek pregnancy test does not give conclusive evidence. Horner,[2] in 1921, called attention to the picture of overriding of the skull bones with cephalic asymmetry as a sign of fetal death. Various other investigators have confirmed the diagnostic value of the picture of the fetal skull. Brain tissue, according to Thoms,[2] of Yale University,

1. Howe, H. W.; and Bodian, D.: Untreated Human Stools as a Source of Poliomyelitis Virus. Jour. Infect. Dis., **66**:198 (May-June) 1940.

2. Thoms, Herbert: Observations on the Roentgenological Evidence of Fetal Death. Surg., Gyn. & Obst., **71**:169 (Aug.) 1940.

is first to show degenerative changes, and it is contended that skull collapse follows brain collapse.

Thoms calls attention, however, to cases in which overlapping of the skull was shown *in utero* in a fetus later born alive. In another case, several roentgenograms showed no overlapping of fetal bones or evidence of death, but a film made twenty-four hours later displayed no movement of the fetus in the interval. The second picture could be almost superimposed over that taken twenty-four hours earlier. Eventually a stillborn fetus was expelled.

Since brain collapse and degeneration have been shown from autopsies to be early changes, the picture of the bones of the skull should be carefully examined when death is suspected. Thoms offers the suggestion that serial roentgenograms which show no evidence of spontaneous fetal movements are significant. The well-known clinical signs, such as absence of heart sounds or other movements, are of course to be thoughtfully interpreted.

TWENTY-FIVE YEARS AGO

From Journals of 1915

Wyeth's Boiling Water Treatment for Goiter.[1]—The skin and area to be injected is thoroughly anesthetized by the injection of a free quantity of a one-half of one per cent novocain solution. One of my steel syringes, taken out of the boiling cauldron, is filled with boiling water, which is immediately injected by inserting the needle well into the substance of the mass. * * * From 10 to 20 minims are forced out in one spot. The needle is then partially withdrawn and the point carried to a new field, and the injection repeated. * * * Three or four such areas may be injected at one sitting, and these may be repeated as required, in one or two weeks, and so on until the tumor disappears.

Unreliability of the Wassermann.[2]—Several months ago we were consulted by a man whose future advancement to an important position was jeopardized because his record contained a diagnosis of syphilis based on a positive Wassermann reaction. He denied ever having had syphilis. * * *

After carefully considering the results of the Wassermann test, the clinician cannot help but be disappointed in its accuracy. When we consider that various representative serologists report positive findings in from 2 to 18 per cent of normal individuals, and that in active syphilis, in which the clinical diagnosis is certain, some serologists report only 50 per cent of positive results, there is every reason to discredit the diagnostic value of the test.

1. Wyeth, John A.: New York Medical Record. Abst. Sou. Med. Jour., **8**:1068, 1915.

2. Uhle, A. A.; and Mackinney, W. H.: Comparative Results of the Wassermann Test. J.A.M.A., **65**:863, 1915.

English Drugs and the Panel Act.[3]—As physicians do not supply drugs to their patients under the insurance act (unlike the custom in private practice) they have no interest in economy. The resulting extravagance has been referred to in previous letters to the *Journal*. A recent report of a Panel (insurance) committee on the subject is instructive The members of the committee were of the opinion that it is essential for the panel committee to adopt a settled policy. * * * Either they must abandon all care of the drug fund or put down excessive prescribing. That two-thirds of the men on the panel can give adequate treatment for an average of less than 36 cents a head per annum shows that excessive prescribing is unnecessary and a waste of public money. They recommended that from time to time warning notices should be sent to those physicians who appeared to be exceeding 50 cents a head, * * * a surcharge should be recommended of those physicians who continued to prescribe excessively after the warnings.

3. London Letter. Excessive Prescribing. J.A.M.A., **65**:967, 1915.

Book Reviews

Operative Surgery. By J. Shelton Horsley, M.D., LL.D., F.A.C.S., Attending Surgeon, St. Elizabeth's Hospital, Richmond, Virginia; and Isaac A. Bigger. M.D., Professor of Surgery, Medical College of Virginia, Richmond, Virginia, with Contributions by C. C. Coleman, M.D., F.A.C.S, Professor of Neurological Surgery, Medical College of Virginia; John S. Horsley, Jr., M.D., Associate Professor of Surgery, Medical College of Virginia; Austin I. Dodson, M.D., F.A.C.S., Professor of Urology, Medical College of Virginia; Donald M. Faulkner, M.D., Associate Professor of Orthopedic Surgery, Medical College of Virginia. Fifth Edition. Two volumes. 1567 pages, illustrated. St. Louis: The C. V. Mosby Company, 1940. Cloth $18.00 per set.

The fourth edition of Horsley and Bigger's "Operative Surgery," which appeared in 1937, was received with such distinct approval that a new edition was called for in 1940. A favorable review of the former edition appeared in this Journal, and the present edition is entitled to the same endorsement.

The fifth edition contains more reading matter by 180 pages than did the previous one. These additional pages were demanded by the inclusion of new developments along general surgical lines and by special enlargements of some of the sections. For example, the section on orthopedics and fractures by Ralth Faulkner has been much enlarged, is more fully illustrated, and contains more operative details than were noted in the previous edition.

Coleman's excellent section on neurosurgery has been improved by the addition of a discussion of the lesions of the intervertebral disks and ligamentum flavum, subjects which have come into prominence in recent years.

Dodson's section on urology contains, in addition to

the material in the 1937 edition, some interesting modifications of Coffey's ureteral transplantation operation.

The seven chapters on plastic surgery, by John S. Horsley, Jr., cover the subject thoroughly. Principles are clearly presented; technic is carefully described, and procedures are profusely illustrated

The above sections are the work of the collaborators in the several specialties.

The classical discourses which Dr. Horsley has contributed to previous editions on general considerations, surgical technic, drainage, operations for malignant tumors, and similar general topics, have been retained. He has also elaborated the chapter on appendicitis, and has added a new chapter on peritonitis in which the symptoms, pathology and treatment of the different types are fully set forth. One of the very interesting chapters, brought over from a previous edition, is that on "The Causes of Cicatricial Contraction." To his excellent chapters on operations on the intestinal tract have been added several new procedures which have been devised since the fourth edition was published.

The chapters on aneurysm and on ligation of blood vessels has been rewritten by Bigger, who also contributes admirable chapters covering surgery of the neck, the thorax, the heart, lungs, esophagus, and sympathetic nervous system. Of the newer procedures which are included may be mentioned those for ligation of the ductus arteriosus, segmental pneumonectomy and a modification of Whipple's operation for excision of the duodenum and head of the pancreas.

The volumes are, perhaps, the handsomest that Mosby has produced. The paper and type are excellent, and the illustrations by Miss Lorraine are unsurpassed.

Principles of Surgical Care Shock and Other Problems. By Alfred Blalock, M.D., Professor of Surgery, Vanderbilt University School of Medicine, Nashville, Tenn. 325 pages. St. Louis: The C. V. Mosby Company, 1940. Cloth $4.50.

In this volume a master research worker, who is at the same time an eminent surgeon, expresses himself. Dr. Alfred Blalock can support his views on the care of surgical patients by a large amount of laboratory studies which he has made himself, as well as through a wide experience in clinical surgery. The author enshrouds his treatise with the most recently recognized principles of physiology, as they apply to the care of patients undergoing surgical treatment. Shock, or peripheral circulatory failure, is a predominant theme throughout this monograph. It is a subject on which the author is a widely recognized authority by reason of his numerous investigations and on the basis of these he advances principles of importance in the preoperative and postoperative care of surgical patients. Perhaps the review of experiments pertaining to shock is somewhat too extensive. Also, fully discussed, are such related problems as dehydration, acid base disturbances, hypoproteinemia, avitaminosis, anoxia, pulmonary complications, and intestinal distention.

It is indeed gratifying to find highly scientific material, precisely delineated, with sane clarity of reasoning, for practical application in the care of surgical patients as it is presented in this delightful monograph. With each chapter there is a valuable bibliography.

The Compleat Pediatrician. By W. C. Davison, M.D., Professor of Pediatrics, Duke University School of Medicine; Formerly Acting Pediatrician in Charge, Johns Hopkins Hospital. 256 pages. Durham, N. C.: Duke University Press, 1940. Cloth, $3.75.

The necessity for the publication of a third edition of this work so soon after the second edition was completely sold, is positive evidence that this volume fills a definite need in the practice of physicians. The data admirably presented in former editions have been brought up to date, making it necessary to change 10,000 lines of the text following a review of 3,700 recent pediatric articles. The general plan of presentation followed in the second edition is continued in this one.

There is a section devoted to symptomatology, differential diagnosis, incidence and prognosis of all the known diseases of children. The latest and most accepted method of treatment is given in detail. That part devoted to feeding, in which all the special diets are described, is especially useful. Those sections devoted to laboratory tests, and to growth, development and child guidance alone make the volume indispensable. Seldom does one encounter a mass of useful information such as this condensed into a small book.

A Textbook of Histology. By Harvey Ernest Jordan, A.M., Ph.D., Professor of Anatomy and Director of the Anatomical Laboratories, University of Virginia. Eighth Edition. 690 pages, illustrated. New York: D. Appleton-Century Company, Inc., 1940. Cloth $7.00.

For more than two decades this book has been a standard text in histology and its usefulness is evidenced by the appearance of an eighth edition. Its general plan remains unchanged. The chapter on the blood has been entirely rewritten and the chapters on muscle, the endocrine organs, the female reproductive system and the blood vascular system have been thoroughly revised. The illustrations are numerous and excellent. The removal of literature citations from the text is helpful. All references are recorded as footnotes and reassembled in a bibliographical list at the end of the book. This list is ample and convenient for the student who may wish to pursue the study of particular subjects beyond the practical limits of the text.

This text should continue to find a wide field of usefulness in the teaching of histology.

Clinical Heart Disease. By Samuel A. Levine, M.D., F.A.C.P., Assistant Professor of Medicine, Harvard Medical School, Boston. Second Edition. 495 pages, illustrated. Philadelphia: W. B. Saunders Company, 1940. Cloth $6.00.

The second edition of Dr. Levine's book retains the same general approach as the first edition. It is not a book of reference and there is no attempt toward an encyclopedic discussion of all the minutiae of heart disease. The purpose is clearly that of presenting the chief practical problems which the practitioner encounters in his daily experience. The book is written entirely from the point of view of the author's personal observations and outlook in regard to the problems discussed. Since the first edition the sections dealing with the mechanism of heart failure and with the action of digitalis have been brought into line with the most modern scientific evidence on these subjects. A brief

but important chapter on the medicolegal aspects of heart disease has been added. Otherwise the volume is much like the first edition except that numerous small improvements have been made.

The book is good in all parts, excellent in some parts and superb in a few respects. Perhaps the outstanding feature is the emphasis on the information which can be gained by purely bedside methods. The section on electrocardiography represents a compact, lucidly written summary of nearly all of the important practical information on this subject. The chapter entitled "Paroxysmal Rapid Heart Action" is probably the most useful discussion on this subject which can be found anywhere in medical literature. The chapters on angina pectoris, coronary thrombosis and on thyroid heart disease are also of an unusually high standard of excellence. Everyone who treats patients with heart disease, whether he be a general practitioner, internist or cardiologist, can profit from reading this unusually valuable book.

Atlas of Cardioroentgenology. By Hugo Roesler, M.D., F.A.C.P., Associate Professor of Roentgenology, Cardiologist in the Department of Medicine, Temple University School of Medicine and Hospital, Philadelphia. 124 pages, illustrated. Springfield, Illinois: Charles C. Thomas, publisher, 1940. Cloth $8.50.

The book is a clear and complete presentation of the application of roentgenology in the diagnosis of disease of the heart and great vessels. It is presented in the form of case reports. Other diagnostic procedures such as electrocardiography, ophthalmoscopy, clinical and laboratory studies are correlated with the x-ray examinations. The postmortem findings are explained and associated with the departures from the normal in the silhouettes.

The book will be a real addition to the library of the cardiologist or roentgenologist. It is complete, but presupposes fundamental knowledge. The print and illustrations are well executed.

Clinical Roentgenology of the Alimentary Tract. By Jacob Buckstein, M.D., Visiting Roentgenologist (Alimentary Tract Division), Bellevue Hospital, New York City; Consultant in Gastro-Enterology, Central Islip Hospital. 652 pages, illustrated. Philadelphia: W. B. Saunders, 1940. Cloth, $10.00.

The author has beautifully outlined this book into the following parts: esophagus; stomach; duodenum; the small intestine; the large intestine; gall bladder and bile ducts; and the spleen, liver, and pancreas.

Relative to the esophagus he writes at length on congenital anomalies; displacement and compression by cardiac enlargement, and other intrathoracic conditions; diverticula; cardiospasm; varices; and benign and malignant lesions. Clear and instructive roentgenograms and case histories accompany the discussions. Methods of examination and technic in the various lesions are presented, thus showing the importance of close cooperation between the radiologist and gastro-enterologist. Twenty-two pages are given to a description of the normal stomach; the methods of visualizing the various parts, and the characteristic appearance of each. With this well in mind, he passes to the pathologic lesions. Every conceivable lesion, including anomalies, benign and malignant, is discussed and all are well illustrated. His description of the gastric mucosa and technic of examining it is worthy of particular comment. The sections on the duodenum, small intestine, and large intestine, are written with the same precision and clarity as those on the esophagus and stomach. It would be impossible to enumerate all the good points brought out in these sections; but the part describing "Tumors of the Small Intestine" is of particular interest and shows a great deal of intense detailed study.

Fifty pages are devoted to the technic and examination of the pathologic lesions of the biliary tract and ten pages to diseases of the pancreas. There are an attached bibliography and 525 illustrations.

The author has well described the details essential to a proper roentgenologic study of the functional and organic changes in the entire gastro-intestinal tract. He has correlated the pathologic changes found at operation and autopsy with those produced by such lesions in the roentgenogram. This book is a valuable reference text to medical libraries and to the general practitioner, and most particularly to the radiologist and gastro-enterologist

---

Arthritis and Allied Conditions. By Bernard I. Comroe, A.B., M.D., F.A.C.P., Instructor in Medicine, University of Pennsylvania; Ward Physician, Hospital of the University of Pennsylvania. 752 pages, illustrated. Philadelphia: Lea & Febiger, 1940. Cloth $8.50.

It is with considerable enthusiasm that a review of this book is written. The subject of arthritis is here presented as a focal point of many avenues of approach. The first chapter is an outline of useful points in the complete study of the arthritic patient which is worth the price of the book. The method of presenting in outline the salient points in diagnosis and in treatment is effective. The laboratory procedures, x-ray appearances, modern methods of management will be most helpful to the general practitioner and specialist.

One is impressed with the excellent chapters on rheumatic fever, backache, painful shoulder, painful feet, sciatica, tumors of joints and tendons. It is not a book on orthopedic surgery exclusively. It is a charming presentation of an important subject, and one of the most complete works of its kind now available.

Bacteriology of Public Health. By George M. Cameron, Ph.D., Associate Professor of Bacteriology, University of Tennessee. St. Louis: The C. V. Mosby Company.

This book presents an interesting historical review of the development of our present knowledge of bacteriology. In chapters on the contagious and infectious diseases which afflict man, disease and causative organism are discussed from the public health standpoint. Laboratory methods have been omitted and only brief explanation of diagnostic tests have been included.

The text represents a departure from the usual method of treating bacteriology in that it adheres strictly to the public health viewpoint. It should be a useful source of information for the doctor in practice as well as for the student of medicine.

Treatment in General Practice: The Management of Some Major Medical Disorders. Volumes 1 and 2. Volume 1, 259 pages; volume 2, 436 pages, illustrated. Boston, Massachusetts: Little, Brown & Co., 1939. Cloth $7.50.

The first volume of this set (British edition) was reviewed in this JOURNAL in December, 1936. There are a few revisions in the American edition, for example, the introduction of chemotherapy in scarlet fever, to bring it up to date.

The second volume contains sections on diseases of the nervous system, digestive system, some blood diseases and diseases of the kidneys. The presentations give a clear-cut picture of the pathologic condition and a practical method of treatment as practiced in the British Isles. These volumes will delight the seeker of practical knowledge in treating major medical disorders.

The Early Diagnosis of the Acute Abdomen. By Zachary Cope, B.A., M.D., M.S., Lond., F.R.C.S., Eng., Surgeon to St. Mary's Hospital, Paddington; Senior Surgeon to the Bolingbroke Hospital, Wandsworth Common; Late Hunterian Professor and Arris and Gale Lecturer, Royal College of Surgeons. Eighth Edition. 275 pages, illustrated. New York: Oxford University Press, 1940. Cloth $3.75.

This little volume of 257 pages has gone through eight editions and twelve printings since its first appearance in 1921. It is richly deserving of the popularity that it has attained.

A chapter on the principles of diagnosis of acute abdominal disease is followed by chapters on methods of diagnosis which give careful directions to be followed in taking the history and minute details for proper examination. Every student of surgery will profit by following the author through these chapters.

Much stress is laid on important points in the differential diagnosis of diseases of the intra abdominal organs.

An important section is devoted to a discussion of general diseases which present symptoms simulating acute abdominal disease, or which may be complicated by extension to abdominal viscera. Influenza, diabetes, typhoid fever, acute cardiac disease, food poisoning and tabes dorsalis are among the diseases considered in this group.

Illustrative Electrocardiography. By Julius Burstein, A.B., M.D., Associate Electrocardiographer and Chief of the Cardiac Clinic, Morrisania City Hospital, New York. Originally written by the Late Joseph H. Bainton, A.B., M.D., and Julius Burstein, A.B., M.D. Second Edition. 292 pages illustrated. New York: D. Appleton-Century Company, Inc., 1940. Cloth $5.00.

This is a second edition of a useful book. It presents concisely all of the important information which is needed to interpret the great majority of electrocardiograms. After a consideration of the normal electrocardiogram the various arrhythmias are discussed and there is then a comprehensive consideration of T-wave abnormalities, the effects of digitalis, and an excellent and up-to-date discussion of the many recent advances which have been made in regard to precordial leads. So much has been written about the latter subject within the past few years that the physician who has not time to read the literature comprehensively is likely to feel lost. A few hours with this book will do much to clarify the confusion.

The book contains 106 illustrations, each of which shows a number of electrocardiographic patterns. It can be strongly recommended to anyone who wishes to keep up in this rapidly changing and important field.

A Manual of Otology, Rhinology and Laryngology. By Howard Charles Ballenger, M.D., F.A.C.S., Assistant Professor of Otolaryngology, Northwestern University School of Medicine, Chicago, Illinois. 302 pages, illustrated. Philadelphia: Lea & Febiger, 1940. Cloth $3.75.

This volume is exactly what it purports to be, concise and condensed, with enough explanations of pathology, sufficient illustrations to give one a clear conception of the subject. The advice for therapeutic measures is brief, but definite and satisfactory.

The index seems adequate and the book will be especially welcomed by undergraduate students as the larger volumes by the same author has been by specialists.

Manual of Cardiology: Clinical Methods and Case Histories as Problems for Study. By William Duncan Reid, A.B., M.D., F.A.C.P., Assistant Professor of Medicine, Boston University School of Medicine; Cardiologist to the Massachusetts Memorial Hospitals. New York: Oxford University Press, 1940. Cloth $3.50.

The unusual feature of this book is that the material is presented in the form of problems arising from specific case histories. The book is practical and in general sound. Although it contains little or no information which is not available in other volumes, it will be useful to those physicians who particularly like this method of presentation.

Dermatologic Allergy. By Marion B. Sulzberger, M.D., Assistant Clinical Professor of Dermatology and Syphilology, Skin and Cancer Unit of the New York Postgraduate Medical School and Hospital of Columbia University. First Edition. 540 pages, illustrated. Baltimore, Maryland: Charles C. Thomas Company, 1940. Cloth $8.50.

Sulzberger's "Dermatologic Allergy" is probably the only book which deals exclusively with this subject. There are many textbooks on dermatology, yet there is a distinct need of a book in this particular field. Sulzberger's work describes many original experiments which are apt and illustrative.

The first lecture is confined to classification and definitions of most of the important special terms used. Lecture 6, on eczematous contact type dermatitis, is exceptionally interesting and instructive and details many points necessary in arriving at a definite diagnosis.

Local allergic manifestations in infectious diseases, tuberculosis and fungous diseases are adequately discussed.

This book should be a distinct stimulus for further writing and research on an important phase of dermatology.

Simplified Diabetic Manual with 163 International Recipes (American, Jewish, French, German, Italian, Armenian, etc.). By Abraham Rudy, M.D., Associate Physician and Chief of the Diabetic Clinic, Beth Israel Hospital. Introduction by Dr. Frederick M. Allen. 216 pages. New York: M. Barrows & Company, Incorporated, 1940. Cloth $2.00.

Emphasis has been placed on the modern dietary treatment of the diabetic. Vitamin and mineral requirements are stressed by the presentation of charts regarding minimal and adequate requirements.

The book contains 150 recipes for all nationalities with substitution charts to vary the menus.

There is a general discussion of the principles involved in the treatment of the diabetic, together with an analysis of the most common complications of this disease.

There is a comprehensive chapter devoted to the types of insulin used, one on insulin reactions with regular insulin, with protamine-zinc insulin, and solution of zinc-insulin crystals.

The patient, the dietitian and the general practitioner will find the book extremely useful.

Urine Examination and Clinical Interpretation. By C. E. Dukes, M.Sc. (London), M.D. (Edin.), D.P.H. (London), Pathologist to St. Peter's Hospital for Stone and Other Diseases of the Urinary Organs, London; Pathologist to St. Mark's Hospital, London. 403 pages, illustrated. New York: Oxford University Press, 1939. Cloth $8.00.

A text which gives methods for routine procedures in doing the simpler bacteriologic, chemical and microscopic tests on urine as used by the writer in his laboratory. From his ten years of experience as a pathologist, he gives a clinical interpretation for each test. The more elaborate tests have been collected from the literature. The color plates on the Aschheim-Zondek test are excellent. While some recognized laboratory tests used in this country are omitted, the physician will find much of interest in this book.

The Public Health Nurse and Her Patient. By Ruth Gilbert, Supervisor of Social Work, Psychiatric Service in the Community, New Haven; Formerly Mental Health Supervisor, Visiting Nurse Association, Hartford. 396 pages. New York: The Commonwealth Fund, 1940. Cloth $2.25.

The principles of mental hygiene have found applicability in many fields of human endeavor; in nursing, social work, sociology and others; in addition to the medical sciences. The significance of this lies in the necessity of understanding human behavior and human motivation, whenever and wherever human beings are studied and aided.

In this volume, the author discusses the specific relationship of mental hygiene to public health nursing. She not only discusses mental hygiene, but also the fundamentals of normal and abnormal psychology inherent in nurse-patient relationships and in nurse-organization relationships.

The material is well presented with numerous case histories scattered throughout and is easily read. Many aspects of mental hygiene are not presented, but the reader will be stimulated to read elsewhere for the additional information.

This book is a definite contribution not only to public health nursing, but to nursing in general, and can be read with value by social workers as well.

Southern Medical News

SYMPOSIUM ON INDUSTRIAL HEALTH

The Department of Preventive Medicine, Medical College of Virginia, Richmond, will sponsor a Symposium on Industrial Health on Thursday and Friday, September 12 and 13. All meetings will be held in the Baruch Auditorium in the Egyptian Building. An unusually strong program has been prepared covering all phases of industrial health. The sessions are being held at 9:30 a. m., 2:00 p. m. and 8:00 p. m. on Thursday and at 9:00 a. m. and 2:00 p. m. on Friday with members of the faculty presiding at the various sessions. A registration fee of $5.00 will be charged. For program and further information, write Dr. Fred J. Wampler, Professor of Preventive Medicine, Medical College of Virginia, Richmond, Virginia.

ALABAMA

The Jefferson County Medical Society announces its Second Annual Postgraduate Seminar to be held Monday and Tuesday, September 16-17, in the Society's Auditorium in the Out-Patient Building at Hillman Hospital, Birmingham. Outstanding physicians in various branches of medicine have been selected for the program: Medicine, Dr. Marion Arthur Blankenhorn, Cincinnati, Ohio; Surgery, Dr. William Dew Gatch, Indianapolis, Indiana; Orthopedic Surgery, Dr. John Albert Key, St. Louis, Missouri; Obstetrics and Gynecology, Dr. Francis Bayard Carter, Durham, North Carolina; Pediatrics, Dr. William Wirt Waddell, Jr., Charlottesville, Virginia; Metabolic Diseases and Endocrinology, Dr. George Argale Harrop, Princeton, New Jersey. No charge is made for registration. Dr. Ralph Morgan and Dr. Edgar Givhan, Birmingham, are in charge of arrangements.

Dr. James S. McLester and Dr. Tom D. Spies, both of Birmingham, have been chosen members on a five-man Board of Nutritional Experts to aid the Government in studying nutritional problems of the Army and Navy.

Dr. Otis F. Gay, Ashland, has been appointed Head of the Health Unit in Butler County to succeed Dr. William M. Askew, Jr., Greenville, who resigned to enter private parctice.

Dr. David B. Snelling, Butler, has been appointed Health Officer of Greene County with headquarters in Eutaw.

Dr. Rutherford O. Ingham, Montgomery, has been appointed Health Officer of Henry County with headquarters in Abbeville.

Dr. John T. Oliver, formerly of Auburn, has moved to Birmingham, where he will practice medicine and will be connected with the medical department of the Stockham Pipe Fittings Company.

Dr. Joseph Dimmick Wilson and Miss Katherine Beverly Lanier, both of Birmingham, were married on August 14.

Dr. James S. DuBois, Enterprise, and Miss Ethel Bentley, Tallapoosa, Georgia, were married August 4.

DEATHS

Dr. Alfred Clinton Smith, Lanett, aged 53, died May 18.
Dr. Thomas Jefferson Marcus, Clanton, aged 69, died July 31.
Dr. J. F. Burnan, Scottsboro, aged 74, died July 31.
Dr. Eugene Elmo May, Birmingham, aged 63, died July 24.

ARKANSAS

Dr. Harry Hayes, Little Rock, has been elected President of the Pulaski Heights Lions Club.

Dr. Roy I. Millard, formerly with St. Mary's Hospital, has opened offices for the practice of medicine in Russellville.

Dr. K. T. Mosley, Texarkana, has returned to duty as Director

Continued on page 38

Attention . . .

EVERY USER OF X-RAYS!

Get your FREE copy of this new and most unusual booklet that tells

1. How to get longer intensifying screen life.
2. How to greatly improve the quality of your negatives.
3. How to reduce retakes.

NEVER BEFORE has there been any booklet on intensifying screen use and care like "MINUTES THAT MATTER". It's as different from the usual dry-as-dust instruction booklet as day is from night. "MINUTES THAT MATTER" is a fresh, interesting presentation of the story of screen use that drives home the vital importance of *proper* screen care.

Advantages? Doctors and technicians alike have found that the invaluable hints in "MINUTES THAT MATTER" have helped them save time, money and unnecessary trouble . . . by showing them the way to improved quality, fewer retakes, and longer, better service from their intensifying screens.

We'll wager that once you start to read "MINUTES THAT MATTER". . . you won't stop until you reach the end! Doctors and technicians who have already read it are enthusiastic. As one radiologist said, "I didn't realize that proper screen care is so important until I read 'MINUTES THAT MATTER'. I not only found out—but I thoroughly enjoyed your most unusual treatment of the subject, including the caricatures."

Your FREE copy of "MINUTES THAT MATTER" will go forward by return mail. Mail the coupon below.

THE PATTERSON SCREEN COMPANY
Towanda, Pa., U. S. A.

MAIL THIS COUPON

The Patterson Screen Company
Towanda, Pennsylvania

Please mail me my FREE copy of Booklet No. 198 today!

Name .....

Address .....

City .....

Harvard Medical School

Courses for Graduates

Minor Surgery Designed for Practitioners. Given by Dr. Charles C. Lund and Associates at the Boston City Hospital. Daily, all day.
(Oct. 1-31, inclusive)
Fee $150

Fracture Course for Graduates. The Fracture Clinic of Massachusetts General Hospital offers an intensive six-day course. Daily, 9:00 a.m. to 9:30 p.m.; week preceding Congress of the American College of Surgeons.
(Oct. 14-19, inclusive)
Fee $75

Diagnosis and Treatment of Injuries to the Brain and Spinal Cord and Their Coverings. Given by Dr. Donald Munro and Associates at the Boston City Hospital. Daily, all day.
(Oct. 28-Nov. 2, inclusive)
Fee $40

For further information apply to Assistant Dean, Courses for Graduates, Harvard Medical School, Boston, Massachusetts.

Continued from page 1014

of the Miller County Health Unit after completing his study in public health at Harvard University.

Dr. Jack Ellis, Hot Springs National Park, has been elected President of the Lions Club of that city.

Dr. C. H. Finney, formerly of St. Louis, has joined the Cooper Clinic at Fort Smith.

Dr. Hugh Mobley, formerly of Wilson, has been appointed Health Officer for White County and is now located at Searcy.

DEATHS

Dr. James A. Christian, Dardanelle, aged 44, died May 2 of coronary occlusion and ruptured appendix.

Dr. Edward Laurence Patterson, Fayetteville, aged 55, died May 22 of coronary thrombosis.

Dr. Samuel B. Steele, Hot Springs National Park, aged 70, died May 4 of chronic nephritis and uremia.

Dr. Andrew Rufus Howell, North Little Rock, aged 76, died July 19 of intestinal obstruction.

Dr. Richard Adolphus Harkins, Fort Smith, aged 59, died May 16.

Dr. Perry Smith Holmes, Mountain Pine, aged 67, died June 20 of myocarditis, influenza and nephritis.

Dr. John Thompson Altman, Jonesboro, aged 57, died July 17 of heart disease.

Dr. Charles R. Teeter, Russellville, aged 65, died July 13.

Dr. Jacob S. Thompson, Stephens, aged 83, died July 10.

DISTRICT OF COLUMBIA

The Medical Society of the District of Columbia has elected the following officers for the coming year: President-Elect, Dr. Henry R. Schreiber; President, Dr. Daniel L. Borden; Vice-Presidents, Dr. Elizabeth E. Chickering and Dr. Robert Lomax Wells; Secretary, Mr. Theodore Wiprud, re-elected, all of Washington.

Dr. William Charles White, Washington, was awarded the Trudeau Medal at the annual meeting of the National Tuberculosis Association in Cleveland recently.

Continued on page 40

THE NEW YORK POLYCLINIC
MEDICAL SCHOOL AND HOSPITAL

(ORGANIZED 1881)

(*The Pioneer Post-Graduate Medical Institution in America*)

UROLOGY

A combined full time course in Urology, covering an academic year (8 months). It comprises instruction in pharmacology; physiology, embryology; biochemistry; bacteriology and pathology; practical work in surgical anatomy and urological operative procedures on the cadaver; regional and general anesthesia (cadaver); office gynecology; proctological diagnosis; the use of the ophthalmoscope; physical diagnosis; roentgenological interpretation; electrocardiographic interpretation; dermatology and syphilology; neurology; physical therapy; continuous instruction in cysto-endoscopic diagnosis and operative instrumental manipulation; operative surgical clinics; demonstrations in the operative instrumental management of bladder tumors and other vesical lesions as well as endoscopic prostatic resection.

Proctology, Gastro-Enterology

and ALLIED SUBJECTS

FOR INFORMATION ADDRESS

MEDICAL EXECUTIVE OFFICER, 345 West 50th Street, NEW YORK CITY

DOCTOR! *You are invited to attend . . .*

THE OKLAHOMA CITY CLINICAL SOCIETY'S

TENTH ANNUAL FALL CLINICAL CONFERENCE

October 28, 29, 30, 31, 1940

SEVENTEEN DISTINGUISHED GUEST LECTURERS

DR. ELMER BELT, Urology, Los Angeles; Associate Prof. Urology, College of Medical Evangelists; Urologic Consultant, U. S. Military Hosp., Sawtelle.

DR. W. B. CARRELL, Orthopedics, Dallas; Prof. Orthopedic Surg., Baylor Medical Sch.; Chief Surg. to Scottish Rite Hosp. for Crippled Children.

DR. ROBERT J. CROSSEN, Gynecology, St. Louis; Prof. Clinical Obstetrics and Gyn., Washington U. Med. School; Asst. Obs. and Gyn. to Barnes Hosp.

DR. M. EDWARD DAVIS, Obstetrics, Chicago; Asso. Prof. Obs. and Gyn., U. of Chicago; Attending Obs. and Gyn., Chicago Lying-in Hosp.

DR. EDGAR L. GILCREEST, Traumatic Surgery, San Francisco; Clin. Instructor in Surg., U. of Calif. Med. School; Visiting Surg. of Stanford, St. Francis, Franklin and Children's Hospitals.

DR. ELLIOTT P. JOSLIN, Diabetes, Boston; Clin. Prof. Emeritus, Harvard Medical Sch.; Med. Director Geo. F. Baker Clinic of New England Deaconess Hosp.

DR. NORMAN M. KEITH, Internal Medicine, Rochester; Prof. of Medicine, Mayo Foundation, U. of Minn.; Consultant on Staff of Mayo Clinic.

DR. JOHN G. McLAURIN, Otolaryngology, Dallas; Executive Staff Med. Arts Hosp.; Courtesy Staff Baylor Hosp. and St. Pauls Sanitarium.

DR. KARL A. MEYER, Surgery, Chicago; Asso. Prof. of Surgery, Northwestern U.; Sr. Attending Surg., Cook County Hosp.

DR. JOSEPH EARLE MOORE, Syphilology, Baltimore; Assoc. Prof. of Medicine, Johns Hopkins University.

DR. JOHN deJ. PEMBERTON, Surgery, Rochester; Prof. of Surgery, Mayo Foundation; Surgeon at Mayo Clinic.

DR. HENRY G. PONCHER, Pediatrics, Chicago; Associate Prof. of Pediatrics, Univ. of Ill.; Attending Phys. Cook County Children's Hosp.; Charge of Pediatric Ward, Research and Education Hospitals.

DR. FRANCIS M. POTTENGER, Tuberculosis, Monrovia; Clinical Prof. of Med., Univ. of Southern Calif. Sch. of Med.; Consultant, Los Angeles Gen. Hospital.

DR. ERNEST SACHS, Neurological Surgery, St. Louis; Prof. of Clin. Neuro-Surg., Wash. U. Sch. of Med.; Assoc. Surg. to Barnes, St. Louis Children's and St. Louis Maternity Hospitals.

DR. EDMUND B. SPAETH, Ophthalmology, Philadelphia; Prof. of Oph., Grad. School of Med., U. of Pennsylvania; Chief of Clinic, Grad. Hospital; Attending Surg., Wills Hosp.

DR. NATHAN B. VAN ETTEN, President A. M. A., New York; Med. Director Morrisania City Hosp., Pres. since 1932; Pres. Union Hosp., 1936.

DR. RICHARD S. WEISS, Dermatology, St. Louis; Ass't Prof. of Clinical Dermatology, Sch. of Med., Washington University; Derm. to Barnard Free Skin & Cancer Hosp.

General Assemblies Roundtable Luncheons Evening Symposium
Postgraduate Courses Commercial Exhibits

Registration fee of $10.00 includes all the above features.

For further information address Secretary, 512 Medical Arts Building, Oklahoma City

Continued from page 38

Dr. Robert H. Harmon and Dr. Howard F. Kane, both of Washington, were elected President and Vice-President, respectively, of the George Washington University General Alumni Association at the recent annual meeting.

Dr. Winfred Overholser, Washington, was awarded the honorary degree of Doctor of Science by Boston University, Boston, on June 10. The citation prepared by the University in conferring this honor stated the degree was being awarded because Dr. Overholser "has become a foremost psychiatrist of the present age."

Dr. William DeKleine, Washington, National Medical Advisor of the American Red Cross, recently received the Alumni Merit Award from Northwestern University, Chicago. The merit awards are presented to graduates whose life work has been a credit to the University and to the community.

The Annual Scientific Assembly of the Medical Society of the District of Columbia will be held in the Nation's Capital, October 15-17.

Deaths

Dr. Francis Randall Hagner, Washington, aged 67, died July 7.

Dr. George Leman Collins, Washington, aged 66, died June 17 of acute dilatation of the heart.

FLORIDA

The State Board of Medical Examiners elected the following officers at the recent meeting in Tampa: President, Dr. Benjamin A. Chapman, Jacksonville; Vice-President, Dr. Harold D. Van Schaick, Jacksonville; Secretary, Dr. William M. Rowlett, Tampa, re-elected.

Dr. William H. Pickett, Clearwater, has been elected Assistant State Health Officer.

Dr. Turner Elam Cato, formerly of Charleston, West Virginia, has been placed in charge of the newly created Public Health Unit in Dade County with headquarters in Miami.

Dr. William F. Bay, Bradenton, is taking a course in public health and syphilology at the University of Michigan Medical School, Ann Arbor.

Dr. John H. Mitchell, Jacksonville, was recently installed President of the local Exchange Club.

Deaths

Dr. George W. Holt, Malabar, aged 61, died May 11 of cerebral hemorrhage and chronic myocarditis.

Dr. Henry Vernon Logan, Miami Beach, aged 67, died May 22 of myocarditis.

Dr. Avery Leroy Myrick, Daytona Beach, aged 55, died May 21 of hypertensive heart disease.

Dr. George Bigler Ehrman, Miami Beach, aged 81, died May 23 of pneumonia and uremia.

Dr. Ralph Edwin Stevens, Chattahoochee, aged 49, died June 6 of acute dilatation of the heart.

Dr. David S. Rowland, Miami, aged 71, died May 17 of coronary occlusion and arteriosclerosis.

Dr. James Wilcox Turner, Cedar Keys, aged 62, died June 21 of carcinoma of the prostate.

Dr. Marion Ernest Quina, Pensacola, aged 57, died June 12 of carcinoma of the lung.

Dr. George Elbert Adams, Jacksonville, aged 55, died June 11 of coronary thrombosis.

GEORGIA

Dr. F. Phinizy Calhoun, Atlanta, was recently tendered a dinner by the Fulton County Medical Society at the Piedmont Driving Club honoring his election as President of the American Ophthalmological Society.

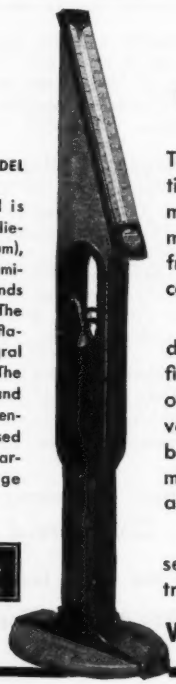
Dr. Guy V. Rice, Jr., Jesup, has been made Medical Director of the Southwestern Health Region with headquarters in Albany.

Dr. Edward S. Armstrong, Cordele, has been made Venereal Disease Control Officer with the Savannah-Chatham County Health Department.

Dr. Charles R. Smith, Morgan, has been made Health Commissioner of Terrell County.

A grant of $10,000 has been allowed by the Rockefeller Foundation to purchase books and journals for the library of the

Continued on page 42



THE STANDBY MODEL

The STANDBY Model is beautifully designed in die-cast Dowmetal (magnesium), one-third lighter than aluminum. It weighs only 7 pounds and is 38½ inches high. The compartment for the inflation system is an integral part of the instrument. The rubber parts, bulb, bag and tubing, are all made of genuine Latex. The recessed glass Cartridge Tube is guaranteed against breakage for the doctor's lifetime.

Lifetime Baumanometer
STANDARD FOR BLOODPRESSURE

IT'S PLAIN TO BE SEEN!

The EXACTILT scale (a Baum innovation) in this new STANDBY Model, is permanently fixed at the *exact* angle for maximum, eye-level reading efficiency from any position. Individual calibration compensates for this unique feature.

In this latest Lifetime Baumanometer doctors from Maine to California are finding the complete answer to routine office bloodpressure taking. Simple, convenient, and impressive, it stands sturdily by desk, table or bedside—as easy to move from place to place as your portable floor lamp.

Have your surgical instrument dealer send you a STANDBY for inspection and trial in your office.

W. A. BAUM CO. INC. NEW YORK

Reproduced from a radiograph made on

BLUE BRAND EASTMAN ULTRA-SPEED X-RAY SAFETY FILM

(See back of this page)

Excerpt from the Medical Literature....

*"There is no bony structure of greater importance to the ophthalmologist than the optic canal. Through this unyielding tube run the optic nerve and the ophthalmic artery. Here in a fixed space and held in contact are two structures subject to diverse diseases. Certain diseases of either, as tumor, aneurysm, or calcification of the ophthalmic and internal carotid arteries, may produce changes in the wall of, or within, the canal, and be detected by roentgenography. Those conditions which are primary in bone, or which result from fusion of bone or traumatism to bone, may affect the eye through the canal and be diagnosed by the roentgen ray. Diseases of the paranasal sinuses more frequently affect the canal and contained structures. * * * So the roentgenologist can be of great service to the ophthalmologist by his ability to examine and give information concerning the canal and its relations."*

—Am. J. Roentgenol., *29:* 410, March, 1933

The obvious excellence of the original radiograph reproduced on the reverse side of this page is due, first, to the knowledge of the radiologist; second, to the inherent properties of the new, Blue Brand Eastman *Ultra-Speed* X-ray Safety Film.

»

REFER YOUR PATIENT TO A COMPETENT RADIOLOGIST

«

EASTMAN KODAK COMPANY

Medical Division—Rochester, N. Y.

Be sure to visit the Kodak Building at the New York World's Fair—Kodak in Medicine, Science, Education . . . a New Cavalcade of Color . . . photographic experts to assist you. You'll find this a genuinely worth-while exhibit.

(See reverse side of this page)

An important contribution for the treatment of the Nutritional Anemias

BĒPRON

WYETH'S BEEF LIVER WITH IRON

A palatable complete preparation for nutritional anemia, BĒPRON contains in each ounce the total soluble constituents of two ounces of unfractionated beef liver including the essential water-soluble dietary factors of liver, the specific pernicious anemia fraction of Cohn and the secondary anemia fraction of Whipple, and 4 grains of iron (Fe) as ferrous-ferric saccharate.

It provides in concentrated form all elements which are essential for the production and maintenance of a normal number of red blood cells with adequate hemoglobin content. When administered in cases of nutritional anemia, BĒPRON causes prompt improvement in the blood picture and in the subjective symptoms. Available at all prescription pharmacies in 8 and 16 oz. bottles. Complete literature on request.

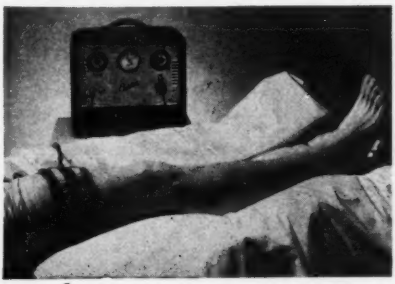
John Wyeth & Brother • Incorporated • Philadelphia, Pa.

A Most Prominent Disease

Authoritative statistics reveal that peripheral vascular disease constitutes one of the most important causes of debility.

A Most Valuable Treatment

Authoritative literature in current periodicals discloses that rhythmic venous constriction provides a comfortable, inexpensive, easily controlled and effective means of therapy for occlusive peripheral vascular disease.



The Burdick Rhythmic Constrictor

is effective in relieving pain, increasing vascularity, elevating skin temperature and improving the prognosis in such conditions as peripheral vascular sclerosis, early thromboangiitis obliterans, acute vascular occlusion, diabetic ulcers, intermittent claudication, chilblains.

AMERICAN MEDICAL ASSOCIATION ACCEPTED COUNCIL ON PHYSICAL THERAPY

THE BURDICK CORPORATION
Milton, Wisconsin

THE BURDICK CORPORATION, Milton, Wis.
I would like further information on Dept. SM-9
THE BURDICK RHYTHMIC CONSTRICTOR

Dr.....

Address .....

City..... State.....

Continued from page 40

University of Georgia School of Medicine, Augusta. This grant will supplement the Moore Fund, given to the school by Mrs. Julia Carter Moore, Augusta.

Dr. J. R. Evans, Decatur, was recently elected President of the Georgia Public Health Association.

Dr. Felix B. Welton, formerly of Newnan, has moved to Toccoa and is associated in the practice of medicine with Dr. W. B. Schaefer.

The Georgia Industrial Surgeons' Association will hold its annual program and business meeting in Atlanta at the Ansley Hotel, Wednesday, September 25.

Deaths

Dr. Albert W. Lewis, Jr., Atlanta, aged 29, died May 13.

Dr. Benjamin F. Shamblin, Lyerly, aged 80, died May 20 of carcinoma of the rectum.

Dr. Boise S. Bomar, Atlanta, aged 55, died June 4 of coronary occlusion.

Dr. Jasper Lee Jackson, Manchester, aged 69, died June 2.

Dr. Hal Sewell Armistead, Atlanta, aged 52, died May 12.

Dr. Edward Colfax McCurdy, Shellman, aged 70, died June 2 of arteriosclerosis.

Dr. Buford B. Jones, Metter, aged 66, died June 26.

Dr. Robert Campbell Eve, Atlanta, aged 71, died June 24.

Dr. George Driver Bragaw, Augusta, aged 54, died July 1 of coronary thrombosis and arteriosclerosis following a laminectomy.

KENTUCKY

The annual meeting of the Kentucky Medical Association will be held in Lexington, September 16-19. For further information address Dr. A. T. McCormack, 620 South Third Street, Louisville, Secretary.

Dr. Aubrey Y. Covington, Morganfield, has been made Health Officer of Scott County with headquarters in Georgetown.

Dr. George B. Davis, Glasgow, has been appointed Health Officer of Hart County.

Continued on page 44

Classified Advertisements

RATES for insertion in the Classified Column are as follows: $2.00 minimum, which includes the first 50 words; for each word in addition to the original 50 words, the charge is 3c.

WANTED—In good condition, used eye, ear, nose and throat instruments, including optical trial case, trial frame, treatment chair, and operating instruments. Write Dept. G-92, care Journal.

FOR SALE—Home-Office Practice, located in Georgia Coast city, established 15 years. Write Dept. G-960, care Journal.

WANTED, LOCATION FOR SURGEON—Southerner. Protestant. Harvard Medical School graduate. Five years' surgical training. At present, member of surgical staff of Eastern medical school and its hospitals, and first assistant to Head of Surgery Department. Wishes to become associated with surgeon or with group of doctors in the South. Write Dept. B-93, Southern Medical Association, Birmingham, Alabama.

Chicago Eye, Ear, Nose & Throat College
Established 1897
231 W. Washington St., Chicago, Ill.

Practical postgraduate course in Ophthalmology and Otolaryngology.

Doctors admitted at any time for review and clinical observation.

Annual Fall Course in Eye Surgery, November 4th to 9th, inclusive. Class limited. Reservations now.

OSCAR B. NUGENT, M.D., Director

Riona

relaxes uterine musculature in Dysmenorrhea

THE Propadrine Hydrochloride in 'Riona' Capsules, because of its sympathomimetic action, relaxes the smooth musculature of the uterus, thereby counteracting the uterine spasm which is a primary cause of functional dysmenorrhea.

Acetylsalicylic acid and acetophenetidin have been included in 'Riona' Capsules because they have been shown to act synergistically with the Propadrine Hydrochloride in alleviating the pain and depression of this condition. 'Riona' Capsules combine Propadrine Hydrochloride ¾ grain, Acetophenetidin (phenacetin) 2 grains and Acetylsalicylic Acid 3 grains, in a dry-filled gelatin capsule. Suggested dosage is one capsule three or four times a day; severe cases may receive one capsule every three hours.

They are supplied in boxes of 30 and 100 capsules individually sealed in cellophane.

Sharp & Dohme

Formula:

Propadrine Hydrochloride . . . ¾ gr.
Acetophenetidin (phenacetin) . . . 2 gr.
Acetylsalicylic Acid . . . 3 gr.

Individually sealed in cellophane

Continued from page 42

Dr. Donald B. Thurber, Louisville, has been appointed Health Officer of Nicholas County with headquarters at Carlisle.

Dr. Harry Gambill Stambaugh, Ashland, and Mrs. Cleo Eubank Ehrlich, were married June 8.

DEATHS

Dr. Arthur Robert Higdon, Fancy Farm, aged 61, died May 12.

Dr. Quintus L. Shelton, Loneoak, aged 73, died May 23 of uremia due to hypertrophy of the prostate.

Dr. Nathaniel J. Ridley, Lexington, aged 73, died May 23 of carcinoma of the abdominal viscera.

Dr. John Alexander Sandbach, Irvington, aged 65, died May 2.

Dr. Lawrence C. Nell, Gradyville, aged 72, died June 21 of cerebral hemorrhage.

Dr. James C. Norris, Augusta, aged 80, died June 13 of myocarditis.

Dr. Moses H. Clagett, Berea, aged 79, died June 10 of cardiorenal vascular disease.

Dr. Robert S. Short, Garner, aged 83, died May 19.

Dr. John Luke Hayden, Louisville, aged 51, died June 25 of pulmonary tuberculosis.

Dr. Charles Clinton Morris, Paducah, aged 60, died June 30 of coronary thrombosis.

Dr. Joseph William Field, Owensboro, aged 60, died June 16.

LOUISIANA

Dr. Hiram W. Kostmayer, New Orleans, is now directing the Division of Medical Extension at Tulane University School of Medicine in combination with his position as Director of the Department of Graduate Medical Studies.

The newly formed Louisiana Association of Pathologists has elected the following officers: President, Dr. Edwin H. Lawson; Vice-President, Dr. Bela Halpert; Secretary-Treasurer, Dr. A. V. Friedrichs, all of New Orleans.

Dr. H. E. Hasseltine, Carville, Medical Director of the Leprosarium has been transferred to Cincinnati, where he will take up his duties as Officer in Charge of the Stream Pollution Investigations Laboratory. Dr. Guy E. Faget, formerly of San Francisco, will be the new Medical Officer in Charge at Carville.

DEATHS

Dr. Hubert Sidney Smith, Thibodaux, aged 75, died May 2 of coronary thrombosis.

Dr. James Crittington Parrott, Natchitoches, aged 66, died May 16 of coronary thrombosis.

Dr. Alfred Anthony Keller, New Orleans, aged 52, died June 14 of coronary thrombosis.

Dr. Samuel Oscar Wilder, Chatham, aged 83, died May 2.

Dr. Marie Olivier Becnel, New Roads, aged 66, died June 26 of cerebral hemorrhage and arteriosclerosis.

MARYLAND

Dr. Donald Dwight Cooper, Towson, and Miss Margaret Matthews, Roanoke, Virginia, were married July 15.

DEATHS

Dr. Donald St. Clair Campbell, La Plata, aged 46, died May 15 of hemorrhage due to esophageal varix.

Dr. James Andrew Long, Frederick, aged 60, died June 16 of heart disease.

Dr. Casper Franklin Jones, Baltimore, aged 76, died May 27 of carcinoma of the prostate.

Dr. Eben Clayton Hill, Baltimore, aged 58, died June 15 of coronary thrombosis.

MISSISSIPPI

The Mississippi State Hospital Association has elected the following officers for the coming year: President, Dr. E. R. Nobles, Rosedale; Vice-President, Dr. John C. Culley, Oxford; Secretary-Treasurer, Dr. Leon S. Lippincott, Vicksburg.

Dr. Taswell Paul Haney, Jr., McComb, who has been on leave of absence for the past year, has been appointed Director of Maternal Hygiene and Child Welfare of the Mississippi State Board of Health.

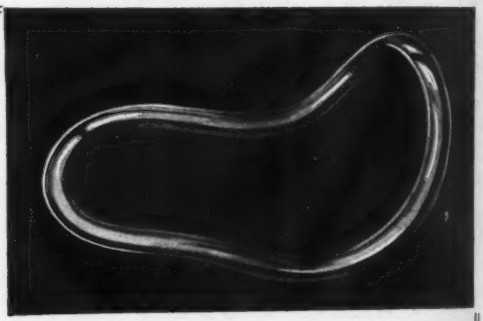
Dr. George E. Riley, Jackson, has been appointed Health Officer in charge of Pike County.

Dr. Donald S. Hall, Vicksburg, announces his association with the Vicksburg Sanitarium and the Street Clinic.

Continued on page 46

The EMMERT Plastic Pessary

Light, Transparent, Non-Absorbent—May be Shaped



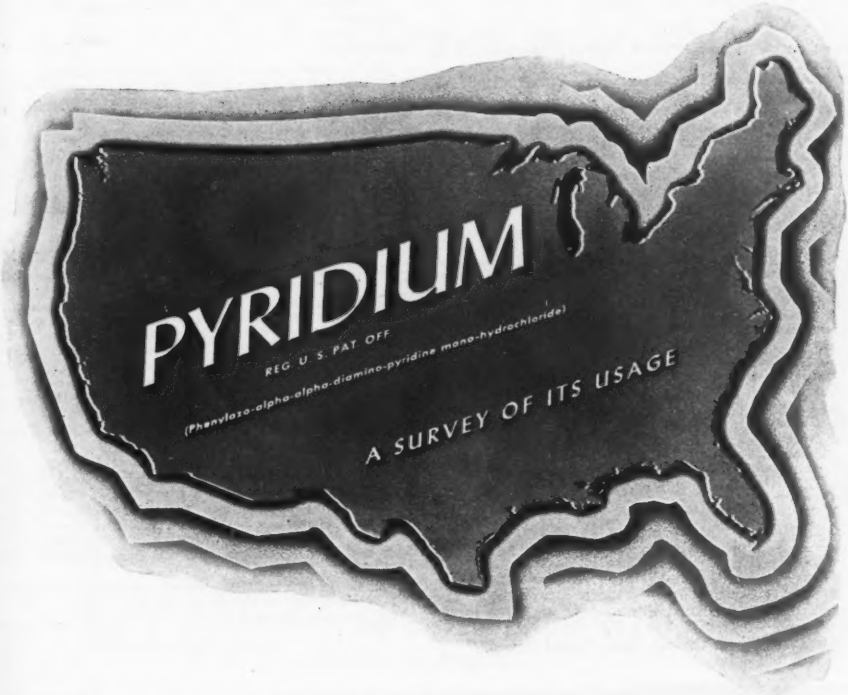
This pessary, as used and endorsed by Frederick V. Emmert, M.D., of Saint Louis, offers several important advantages. It quickly becomes plastic in hot water, may then be shaped to fit the requirements of the individual patient, and hardens again in a few seconds. The material is extremely light in weight, will not absorb odors nor discolor. Inserted, it does not irritate the vaginal mucosa and never loses its smooth finish even after long use. Since it is not affected by body temperatures, repeated visits for adjustments are eliminated. The pessary is easily cleansed with cold water and soap, and may be sterilized with a mild antiseptic solution.

Size	0	1	2	3	4	5
Diam.	2¾″	3″	3¼″	3½″	3¾″	4¼″

Order by mail—state sizes wanted. Each 50c.

A. S. ALOE COMPANY

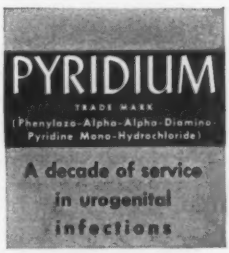
1819 OLIVE STREET, SAINT LOUIS, MISSOURI



THE response to a questionnaire submitted to physicians in various areas of the country shows that the principal urogenital conditions in which Pyridium has been found effective are, cystitis, pyelitis (pyelonephritis), urethritis, and prostatitis in the order given. This closely approximates the experiences of those who have contributed to the published literature.

It is likewise generally established and supported by the published literature that prompt symptomatic relief of distressing symptoms in urogenital infections may be obtained in the majority of cases from the peroral administration of Pyridium. Symptoms such as dysuria, pollakiuria, tenesmus, perineal and suprapubic discomfort, and referred pain respond favorably to Pyridium in ambulant patients without interruption of their vocational pursuits.

PYRIDIUM is the United States Registered Trade-Mark of the product manufactured by Pyridium Corporation.



MERCK & CO. Inc. *Manufacturing Chemists* RAHWAY, N. J.

Continued from page 44

DEATHS

Dr. Robert Arthur Haggard, Arcola, aged 56, died May 15 of angina pectoris.

Dr. James Allen Rhodes, Horn Lake, aged 68, died May 31 of cirrhosis of the liver.

Dr. James V. May, Port Gibson, aged 64, died May 9 of chronic myocarditis and adhesive pericarditis.

Dr. Barton Jones Farr, Glen Allan, aged 67, died May 1 of pulmonary tuberculosis.

Dr. Isaac William Brown, Jackson, aged 71, died June 21.

Dr. Isaac D. Benson, Anguilla, aged 67, died May 11.

MISSOURI

Dr. French K. Hansel, Assistant Professor of Clinical Otolaryngology, Washington University School of Medicine, St. Louis, was awarded the Casselberry Prize of the American Laryngological Association at the recent annual meeting of the Association for his original cytologic observations of the secretions of the nose and sinuses in allergy.

Dr. Nathan K. Pope, Assistant Superintendent of the Missouri State School, Marshall, has been appointed Superintendent of the Criminal Insane Division of the Fulton State Hospital, Fulton.

Dr. Hugh L. Dwyer, Kansas City, has been appointed Director of Health of Kansas City.

Dr. Evarts A. Graham, St. Louis, has been appointed Chairman of a National Defense Surgical Advisory Committee, established by the National Research Council in collaboration with Surgeon General James Carre Magee of the Army and Surgeon General Ross T. McIntire of the Navy.

DEATHS

Dr. Lincoln C. Chenoweth, Joplin, aged 75, died May 5.

Dr. Jordan E. Ruhl, Kansas City, aged 71, died May 30 of carcinoma of the prostate.

Dr. William Cook Martin, Kansas City, aged 69, died May 18 of hemorrhagic nephritis.

Dr. Jefferson D. Hammett, Huntsville, aged 92, died May 12 of chronic myocarditis.

Dr. Ira Hamilton Miller, Louisiana, aged 63, died June 6.

Dr. Elsworth Striker Smith, St. Louis, aged 76, died June 6 of carcinoma of the stomach.

Dr. Joseph Frank Mayes, St. Louis, aged 62, died June 27 of heart disease.

Dr. Vaughan Quaine Bonham, Fayette, aged 83, died June 23 of a fractured hip and chronic myocarditis.

Dr. Robert Emmet Owen, St. Louis, aged 62, died June 22 of coronary occlusion.

Dr. Jesse B. McKinney, Caruthersville, aged 56, died June 23 of heart disease.

Dr. Gerald A. Sparling, Kirksville, aged 84, died June 23 of bronchopneumonia.

NORTH CAROLINA

Dr. David A. Stanton, High Point, was recently honored by the Guilford County Medical Society with a dinner commemorating his fifty-third year in the practice of medicine.

The North Carolina Public Health Association elected the following officers for the coming year at the recent annual meeting in Pinehurst: President, Dr. John W. Williams, Williamston; Vice-President, Dr. Robert E. Rhyne, Gastonia; Secretary, Dr. John S. Anderson, Raleigh.

Dr. Wingate M. Johnson, Winston-Salem, received the honorary degree of Doctor of Science at the recent commencement at Wake Forest College.

Dr. William L. Patman, Greensboro, has been appointed General Director of Chatham Hospital, Siler City.

Dr. Robert L. Russell, Chief of the Tuberculosis and General Medical Service at the Veterans Administration Facility, Oteen, has retired from the service having reached the age limit.

Recently the new addition to Duke Hospital was opened for full use. The wards in the new addition have been named as follows: Surgical, Cushing; Obstetrical and Gynecological, Williams and Holmes; Surgical Children, Matas; Medical, Minot; and Psychiatric, Meyer.

Dr. J. G. Groome, High Point, announces the association of Dr. L. U. Creech in the Groome-Lackey Clinic.

Dr. Thomas Clarence Johnson, Lumberton, was recently pre-

Continued on page 48

Decholin
REG. U.S. PAT. OFF.

A True Choleretic
•
A Single Chemical Entity
•
Virtually Nontoxic

in CHOLANGITIS
is described in the New Third Edition of
"BILIARY TRACT DISTURBANCES"

The new, third edition of the brochure "Biliary Tract Disturbances" is based on more than 200 recently published reports and presents a concise but comprehensive review of the newer developments in the field of biliary tract disease. If you have not received your copy as yet, please write for it today.

Decholin (dehydrocholic acid) for oral use and Decholin sodium for intravenous administration are the only chemically pure bile acid derivatives accepted by the Council on Pharmacy and Chemistry. In non-calculous cholangitis, Decholin, through increasing the secretion of bile by the liver cells, promotes drainage of accumulated pus from the biliary tree, and reduces absorption of toxic end products of infection, thus producing objective as well as subjective improvement. Decholin is contraindicated in mechanical obstruction of the common and hepatic bile ducts.

Riedel - de Haen, Inc.
105 Hudson Street New York, N. Y.

Late Summer and Early Fall

Diarrhea in Infancy

Intestinal disturbances of infants are likely to be as frequent and even more severe now than in early summer.

It is therefore timely to suggest again the following rational and efficient procedure as a means to prevent the development of a serious diarrhea.

Mellin's Food 4 level tablespoons

Water (boiled, then cooled) 16 ounces

Give one to three ounces every hour or two until the stools lessen in number and improve in character.

The mixture may then be strengthened by the gradual substitution of boiled skimmed milk for water until the quantity of skimmed milk is equal to the normal quantity of milk used in the baby's formula. Finally the fat of the milk may be gradually replaced by skimming less and less cream from the milk.

Directions for using Mellin's Food are left entirely to the physician.

Samples sent to physicians upon request.

Mellin's Food Company, Boston, Mass.

MELLIN'S FOOD: Produced by an infusion of Wheat Flour, Wheat Bran and Malted Barley admixed with Potassium Bicarbonate—consisting essentially of Maltose, Dextrins, Proteins and Mineral Salts.

Continued from page 46

sented a handsome gold watch by the Robeson County Medical Society in recognition of his distinguished services as physician, surgeon and citizen.

Contracts have been let for the new Bowman Gray School of Medicine of Wake Forest College in Winston-Salem by the trustees of the North Carolina Baptist Hospital and the Wake Forest College. It is estimated it will take a year to complete the buildings.

Deaths

Dr. Walter Otts Allen, Hendersonville, aged 42, died May 13 of petrositis and pneumococcic meningitis.

Dr. Norman M. Johnson, Durham, aged 87, died June 13 of heart disease.

Dr. James Nelson Gill, Weaverville, aged 87, died June 5 of uremia and chronic nephritis.

Dr. Claude Burgess Williams, Elizabeth City, aged 62, died June 21 of cerebral hemorrhage.

Dr. William Turner Ray, Charlotte, aged 37, died June 16 of heart disease.

Dr. Henry Grady Lassiter, Weldon, aged 49, died August 1 as the result of a cerebral hemorrhage.

Dr. Boney Wells Page, Trenton, aged 63, died August 1 of a heart attack.

OKLAHOMA

Dr. Lewis J. Moorman, Oklahoma City, was recently inducted into office as President of the American Trudeau Society. Recognition was accorded Dr. Moorman for his work in eradication of tuberculosis through local, state and national activities over the past twenty-five years.

The Oklahoma Commission for Crippled Children has established a rheumatic fever and heart service. The work is carried out through the department of Pediatrics of the University of Oklahoma School of Medicine and the Crippled Children's Hospital, Oklahoma City. Clinics are held and eight beds have been set aside in hospitals for patients with active infection. A new ward of sixteen beds has been opened in the Crippled Children's Hospital for the Negro children.

Dr. R. J. Reichert, Moore, did postgraduate work at Cook County Hospital in Chicago during the month of June.

Dr. M. L. Saddoris, Cleveland, has been elected President of the Chamber of Commerce of that city.

Dr. George L. Kaiser, Muskogee, has been appointed physician in charge of venereal disease clinics for the Muskogee City-County Health Unit.

Deaths

Dr. John Cleveland Luster, Davis, aged 64, died May 17 of heart disease.

Dr. C. T. McDonald, Idabel, aged 70, died June 9 of carcinoma of the liver, hypertension and diabetes mellitus.

Dr. Samuel Jacob Fryer, Muskogee, aged 63, died June 19.

Dr. Charles F. Sullivan, Ardmore, aged 76, died June 6.

SOUTH CAROLINA

The Medical College of the State of South Carolina, Charleston, recently dedicated a new building which contains facilities for the school of nursing and the school of medicine and for clinical work. The clinic building has been named the Alumni Memorial Clinic.

Dr. Leo F. Hall, senior resident physician at the South Carolina Tuberculosis Sanatorium was recently honored by being elected Governor for South Carolina in the organization of the American College of Thoracic Physicians. His term of service will be until 1944.

Dr. Hilla Sheriff and Dr. G. J. Zerbst were married July 10. Both are connected with the State Board of Health and will make their home in Columbia.

Dr. H. M. Rutledge, Columbia, has moved to Laurens.

Dr. James Thomas Green and Miss Mary Wright Shand, both of Columbia, were married on June 4.

Dr. Norman Olin Eaddy and Miss Dorothy Compton, both of Sumter, were married on May 29.

Continued on page 50

To Assure Quick Dependable Response

Discriminating Physicians are Prescribing

the easily soluble

DUBIN AMINOPHYLLIN

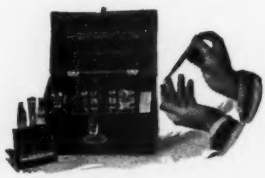
THEOPHYLLINE-ETHYLENEDIAMINE

American Made from American Materials

H. E. DUBIN LABORATORIES
INCORPORATED
250 E. 43rd St. New York, N.Y.

LaMOTTE BLOOD CHEMISTRY SERVICE

LaMOTTE BLOOD SUGAR OUTFIT



For rapid estimation of blood sugar in determining sugar tolerance for diabetic patient. Uses only few drops of finger blood. Permits tests at close intervals. Invaluable for infant cases. Accurate to 10 mg. of sugar per 100 c.c. of blood. Direct results without calculations. Only 20 minutes required for complete test. Complete with instructions, price $24.00, f.o.b. Baltimore, Maryland.

This Service includes a series of similar outfits for conducting the following accurate tests: Blood Urea, Icterus Index, Phenolsulphonphthalein, Urine pH, Blood pH, Gastric Acidity, Calcium-Phosphorus, Blood Bromides, Urinalysis, Sulfanilamide, Sulfapyridine.

LaMOTTE CHEMICAL PRODUCTS CO., Dept. S., Towson, BALTIMORE, MD.

A Cock and Bull Story... that made Medical History

The story began way back when a nameless hero found that castrating a cock (or rooster, if you wish) gave rise to a docile bird dubbed a "capon." Gone were the poor fowl's aggressiveness and his enthusiasm for the lady of his species. His comb, proud symbol of masculinity, shrank away. His solitary value—a delicacy.

In 1849 Berthold established a scientific landmark by *transplanting* the testes of a rooster. Though anatomically castrate, the rooster maintained an endocrinologic *status quo*.

Now, here is where the bull came in: in 1927, it was demonstrated that an adequate amount of properly prepared extract of bull testes could restore the capon to his normal high estate as rooster.

Yes, a cock and bull story if there ever was one—but it made medical history by culminating in the discovery, the identification and then production of testosterone, the male sex hormone. ORETON is Schering's testosterone propionate and ORETON-F TOPLICATORS are Schering's free testosterone in ointment in individual single-dose applicators.

The literature is replete with reports on ORETON in prostatism, hypogonadism and other symptoms of male hormone deficiency, impotence and the male climacteric. In the female, ORETON is used in the treatment of functional uterine bleeding, after-pains, and to suppress unwanted lactation. For modern, potent male sex hormone therapy use Schering's ORETON* (in ampules) and ORETON-F TOPLICATORS.*

*Trade Marks Reg. U. S. Pat. Off.

SCHERING CORPORATION · BLOOMFIELD, NEW JERSEY

SCHERING

Continued from page 48

DEATHS

Dr. William Baker Furman, Easley, aged 56, died May 21.

Dr. J. W. Wyman, Denmark, aged 67, died May 1 of cholelithiasis.

Dr. Harry Ernest Heinitsh, Jr., Spartanburg, aged 45, died June 20 of typhus fever.

TENNESSEE

Dr. Ernest W. Goodpasture, Professor of Pathology, Vanderbilt University School of Medicine, Nashville, was recently awarded the Alvarenga Prize for his outstanding contribution to the knowledge of viruses.

Dr. George W. Jackson, Western State Hospital, has been appointed Health Officer of Bedford County.

Dr. Roscoe Faulkner, Trenton, has been appointed Health Officer of Williamson County to succeed Dr. Don C. Peterson, Franklin, who has been appointed Director of Vital Statistics in the State Health Department.

Dr. Benjamin F. Byrd, Nashville, has been appointed Medical Director of the National Life and Accident Insurance Company, Nashville, to succeed the late Dr. Rufus E. Fort.

Dr. Jack Chesney, Knoxville, and Miss Helen Wallace McColl, Bennettsville, South Carolina, were married July 20.

DEATHS

Dr. Morris Buist Garner, Madison, aged 61, died May 11.

Dr. Robert Newton Pitts, Memphis, aged 74, died May 20 of coronary thrombosis and cardiorenal disease.

Dr. Jefferson D. Campbell, Greeneville, aged 78, died July 10 of carcinoma of the rectum.

Dr. Henry L. McGee, Milton, aged 68, died June 20.

Dr. Thomas Jacob Coble, Shelbyville, aged 69, died May 19 of coronary thrombosis.

Dr. Reese Williams Patterson, Knoxville, aged 57, died June 24.

Dr. George Benjamin Brown, Dyersburg, aged 65, died June 23 of uremia.

Dr. James L. Morton, Shelbyville, aged 60, died May 31 of cerebral hemorrhage.

Dr. Hiram Clark Moorman, Somerville, age 64, died May 17 of coronary occlusion.

Dr. Andrew Frank Richards, Sparta, aged 74, died June 14.

Dr. Joshua Raymond Storie, Cookeville, aged 85, died May 9 of chronic myocarditis.

Dr. B. Vernon Dickson, Covington, aged 63, died June 30 of pleurisy, cardiac insufficiency and chronic tuberculosis of the lung.

Dr. Jesse Thaxton Hayes, Oliver Springs, aged 66, died June 28 of injuries received in a fall.

Dr. William Cocke Lyons, Surgoinsville, aged 72, died June 2.

Dr. George B. Brown, Dyersburg, aged 65, died June 23.

Dr. A. F. Richards, Sparta, aged 74, died June 15.

TEXAS

Dr. John M. Hooper, Austin, has been appointed Director of the McKinney-Collin County Health Unit.

Dr. James H. Stephenson, Houston, has resigned as Superintendent of the Jefferson Davis Hospital. Dr. Sidney B. Hardy is acting Superintendent.

Dr. Berthold H. Estess, New Braunfels, has been placed in charge of the new Health Unit for Jasper and Newton counties with headquarters in Jasper.

Dr. R. L. Alexander, Spur, recently did postgraduate work in Chicago.

Dr. J. W. E. H. Beck, Austin, for the past three years Director of local health services for the State Health Department, resigned recently to return to private practice in his home town, DeKalb.

Dr. Stanley Cox, Groesbeck, recently did postgraduate work in Chicago.

Dr. W. E. Whigham, McAllen, recently did postgraduate work in Philadelphia.

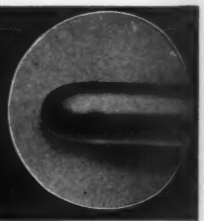
Dr. Joseph Dudgeon Walker and Mrs. Nannie Dunlap Walker, both of Houston, were married July 26.

Dr. Bryant O. Baker has moved from Dallas to Comanche.

Dr. Lewis Barbato has moved from Galveston to Houston.

Continued on page 52

RADON SEEDS



FOR safety and reliability use composite Radon seeds in your cases requiring interstitial radiation. The Composite Radon Seed is the only type of metal Radon Seed having smooth, round, non-cutting ends. In this type of seed, illustrated here highly magnified, Radon is under gas-tight, leak-proof seal. Composite Platinum (or Gold) Radon Seeds and loading-slot instruments for their implantation are available to you exclusively through us. Inquire and order by mail, or preferably by telegraph, reversing charges.

THE RADIUM EMANATION CORPORATION

GRAYBAR BLDG. Telephone MO 4-6455 NEW YORK, N. Y.

Karo is Ideal for Infant Feeding

37 % *Dextrins* .	KARO dextrins are non-fermentable and non-irritating even in highly concentrated solutions because of their low osmotic pressure.
18 % *Maltose* .	KARO maltose is rapidly converted into dextrose requiring no digestion, hence fermentation is rare indeed.
12 % *Dextrose* .	KARO dextrose requires no enzyme activity for digestion, is well tolerated and immediately absorbable without irritation of the intestinal tract.
4 % *Sucrose* .	KARO is flavored with a little sucrose but this small amount is completely digested to monosaccharides.

IN HIGH CALORIC DIETS

your patients will appreciate knowing the many ways in which Karo can be served. We will send to physicians copies of "49 Delightful Ways to Enjoy Karo"—please specify the quantity you require . . . Address

CORN PRODUCTS SALES COMPANY
17 BATTERY PLACE · NEW YORK CITY

ALUMINUM ACETATE

Burow's Solution

Rx ALUMINUM ACETATE POWDER (DOAK)

Sig. 1 teaspoonful to a pint of water. Wet dressing as directed.

Therapeutically this prescription is equivalent to 1% Burow's Solution.

Some physicians prefer to add ALUM. ACET. POWDER (DOAK) to milk or a 3% Boric Acid Solution.

The effect of Alum. Acet. (Doak) (Wet Dressing) is antiphlogistic, astringent and antiseptic. Indicated in acute inflammatory skin conditions and moist eczema.

Requests for reprint and sample receive prompt attention. SMJ 9-40

DOAK CO., INC.
CLEVELAND, OHIO

Continued from page 50

Dr. W. E. Carruth has moved from Brownsville to Littlefield.
Dr. Dan Hines Clark has moved from Quanah to Corpus Christi.
Dr. D. W. Davis has moved from San Antonio to George West.
Dr. G. W. Edgerton has moved from Harlingen to Corpus Christi.
Dr. Albert W. Hartman, Jr., has moved from San Antonio to Boston.
Dr. John J. Hopper has moved from Brownwood to Stanton.
Dr. W. E. Long has moved from Dallas to Boston, Massachusetts.
Dr. S. Perry Post has moved from San Antonio to Boerne.
Dr. R. G. Scobee has moved from Fort Worth to St Louis, Missouri.
Dr. I. L. Van Zandt has moved from Galveston to Fort Worth.
Dr. H. M. Westover has moved from Ropesville to Streetman.
Dr. Carleton C. Wright has moved from Dallas to Memphis, Tennessee.

Deaths

Dr. Theodore Francis Trimble, Corpus Christi, aged 36, was killed May 5 in an automobile accident.
Dr. William Ernest Long, Pearland, aged 60, died May 14.
Dr. Thomas Arlander Martin, Loraine, aged 73, died May 4.
Dr. Summerfield Moon Taylor, Austin, aged 50, died May 27 of coronary occlusion.
Dr. Columbus H. McCuistion, Valley View, aged 77, died May 16 of coronary heart disease.
Dr. Frank Dunn Mabry, Port Arthur, aged 51, died June 8 of cerebral hemorrhage.
Dr. Sam Harmon Taylor, San Antonio, aged 41, died June 3 of coronary thrombosis.
Dr. Leslie Eugene Kelton, Sr., Corsicana, aged 70, died June 19 of coronary occlusion.
Dr. Charles P. Cook, Ennis, aged 68, died June 14 of cerebral embolus and coronary occlusion.
Dr. William C. Hale, Jr., Dallas, aged 64, died June 12.

Continued on page 54

Theocalcin

COUNCIL ACCEPTED

More Comfort for the Cardiac Patient

Prescribe Theocalcin 1 to 3 tablets t. i. d., to diminish dyspnoea, reduce edema and bring comfort to your cardiac patients. Theocalcin is a well tolerated diuretic and myocardial stimulant.

Theocalcin (theobromine-calcium salicylate) is available in 7½ grain tablets and as a powder. Theocalcin Trade Mark reg. U. S. Pat. Off.

BILHUBER-KNOLL CORP. - ORANGE, NEW JERSEY

VEGEX-VITAFOOD DRIED BREWERS YEAST

Since the Mississippi flood in 1928, Vegex-Vitafood Dried Brewers' Yeast has increasingly become the outstanding source of Goldberger's P-P (pellagra-preventive) factor, particularly among health departments and physicians.

Initially, the President of the Company, with a long experience in food and drug administration, the author of one of the first, if not the first, of the laws against medical advertising frauds, determined to and did place the use of this yeast entirely under the direction of physicians and health departments. It has been, with the physician's other treatment, a dependable aid in lowering the pellagra death rate as comparative vital statistics are showing.

And Then

Another outstanding thing has been done. It has been demonstrated that when a product is supplied at a price which people of low incomes can pay, supplied through the wholesaler and retailer and then all treatment directed to the neighborhood physician and health department, a fatal scourge, even during the depression, through the private practitioner, is being conquered.

The Two Types

There are two types of Vegex-Vitafood Dried Brewers' Yeast, the Red Label has the hop flavor removed; the Green Label retains the hop flavor. Both types are packed in one-half pound, one, two and five pound cans or fifty and one hundred pound bags.

This yeast assays 50 International B^1 units per gram and 40 Sherman-Bourquin B^2G (riboflavin) units per gram and supplies the whole of the vitamin B complex. It is high in Goldberger's P-P (pellagra-preventive) factor including the nicotinic acid fraction.

Suggested Administration

A simple and satisfactory way for administration is a tablespoonful stirred into a glass of cold water. The debittered type is furnished in 6 grain tablet form. However, in pellagra, the powder is preferable since the daily dose would require from thirty to sixty tablets.

Vegex

Vegex is the condensed extract of approximately the whole contents of the yeast cell in a more palatable and more available form. It is meat-like in flavor—but meat free—giving wide and tasty food uses. The simplest way of serving Vegex is to dissolve a scant teaspoonful of the paste into a cup of hot water—chill in summer—or hot milk.

●

Samples for clinical or professional use will be sent on request.

VITAMIN FOOD CO., INC. 122 Hudson St. New York, N. Y. **VEGEX, INCORPORATED**

Continued from page 52

Dr. William J. Harlan, Bartlett, aged 65, died May 2 of coronary thrombosis.

Dr. Ralph Semmes Jackson, San Antonio, aged 70, died June 25 of fracture of the left femur and lateral sclerosis.

Dr. Cornelius Howard Duvall, Fort Worth, aged 70, died June 29 of acute pulmonary tuberculosis.

Dr. Charles U. Peterson, Houston, aged 76, died June 6.

Dr. John Harolde Turner, Houston, aged 45, died June 1.

Dr. Robert Woods Noble, Temple, aged 76, died June 20 of acute coronary thrombosis.

Dr. Robert Lee Yeager, Mineral Wells, aged 68, died June 19 of septicemia.

Dr. Burrell Brade Liles, Houston, aged 63, died June 28.

Dr. George B. Parkhill, Crosbyton, aged 62, died June 29.

VIRGINIA

The Medical Society of Virginia elected the following officers for the coming year at the recent annual meeting at White Sulphur Springs: President, Dr. Walter B. Martin, Norfolk; President-Elect, Dr. Roshier W. Miller, Richmond; Vice-Presidents, Dr. J. M. Emmett, Clifton Forge, Dr. J. E. Knight, Warrenton, Dr. H. B. Mulholland, University; Editor, Dr. Wyndham B. Blanton, Richmond; Executive Secretary, Miss Agnes Edwards, Richmond, re-elected.

Dr. I. C. Riggin, Richmond, has been reappointed by the Governor as State Health Commissioner of Virginia for another term of four years.

Dr. Eugene M. Landis, Charlottesville, was elected Secretary of the American Society for Clinical Investigation at its recent annual meeting.

Dr. J. Bolling Jones, Petersburg, has been appointed a member of the State Board of Health by the Governor to succeed Dr. F. W. Darling of Hampton.

Dr. Francis I. Bloise, Alexandria, has accepted the position as Chief Surgeon to the State Prison System of Virginia on a full-time basis. He will have headquarters in Richmond.

Dr. Asa W. Graves, V, has located at Lacey Spring, where he has taken over the practice of his father who died recently.

Dr. E. E. Barksdale, Danville, was awarded a Certificate of Merit in Group I of the Scientific Exhibits at the New York meeting of the American Medical Association for his exhibit illustrating cutaneous manifestation from tobacco with special reference to arsenical exfoliative dermatitis.

Dr. John E. K. Flannagan, Marion, was recently appointed Superintendent and Medical Director of the Municipal Tuberculosis Sanatorium at Roanoke.

Dr. Clyde F. Ross, Richmond, has been appointed venereal disease control officer of that city.

Dr. Arthur A. Davidman, Rocky Mount, and Miss Tamara Zanoff, Baltimore, Maryland, were married July 7.

Deaths

Dr. Thomas Melville Talbott, Falls Church, aged 91, died May 3 of bronchopneumonia.

Dr. Benjamin Robert White, Strasburg, aged 60, died June 21.

Dr. George Washington Hoglan, Bedford, aged 79, died June 5.

Dr. David Nicol Twyman, Appomattox, aged 63, died June 25.

Dr. Norborne Page Cocke, Charlottesville, aged 62, died June 29.

Dr. Alexander L. Martin, Sr., Richmond, aged 71, died June 24.

Dr. John Leonard Jennings, Danville, aged 64, died July 7.

WEST VIRGINIA

The West Virginia State Medical Association elected the following officers for the coming year at the recent meeting at White Sulphur Springs: President, Dr. Robert King Buford, Charleston; First Vice-President, Dr. M. H. Porterfield, Martinsburg; Second Vice-President, Dr. D. G. Preston, Ronceverte; Treasurer, Dr. T. Maxfield Barber, Charleston; Executive Secretary, Mr. Joe Savage, Charleston. The 1941 meeting will be held in Charleston.

Dr. Norman G. Angstadt, Fayetteville, has been appointed Health Officer of Fayette County, succeeding Dr. Leon A. Dickerson, who resigned to join the staff of the State Health Department.

Dr. Albert M. Price, Head of the Division of Communicable Diseases in the State Department of Health, Charleston, has been appointed Health Officer of Kanawha County.

Deaths

Dr. Warren D. Cline, Williamstown, aged 83, died June 5 of diabetes mellitus and coronary occlusion.

Dr. Beuhler B. Richmond, Skelton, aged 64, died in June of myocarditis and cerebral sclerosis.

Dr. Oscar A. Kent, Huntington, aged 69, died June 14 of cerebral hemorrhage.

HEAT
WILT
kalak
This balanced mineral water replenishes essential salts and water lost through excessive perspiration. It tends to inhibit fatigue, muscle soreness and collapse due to excessive exercise at high temperatures. Literature on request.
WHEN IT'S BLAZING HOT
There is Safety in the Shadow of KALAK
KALAK WATER CO. OF NEW YORK, INC., 30 ROCKEFELLER PLAZA, NEW YORK, N. Y.

Wyeth's

SULFUR FOAM APPLICATORS

for the External Application of Sulfur

WYETH'S Sulfur Foam Applicators eliminate the objectionable messiness, smell and discomfort of most sulfur ointments and are acceptable to the patient.

Sulfur Foam is an effective prophylaxis and treatment for scabies and is gaining popularity in other cases where sulfur is indicated externally.

In Sulfur Foam Applicators, the sulfur and a bland soap are impregnated in a special wash cloth. The patient merely moistens the cloth and lathers the area to be treated. The lather dries, leaving a film of sulfur in direct contact with the area.

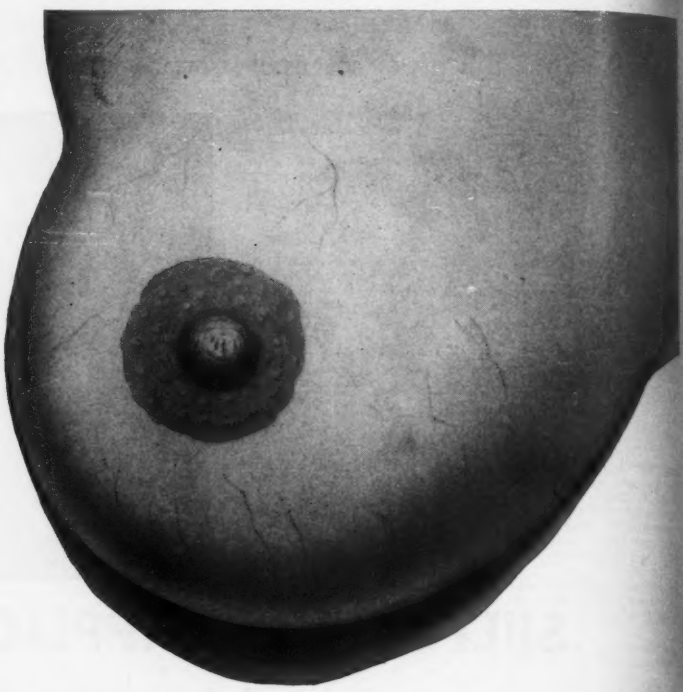
Wyeth's Sulfur Foam Applicators are supplied in packages of three cloths.

YOU ARE INVITED TO WRITE FOR LITERATURE AND FREE SAMPLES

JOHN WYETH & BROTHER, INCORPORATED
PHILADELPHIA, PA WALKERVILLE, ONT.

"A pair of substantial mammary glands have the advantage over the two hemispheres of the most learned professor's brain, in the art of compounding a nutritive fluid for infants."

OLIVER WENDELL HOLMES, M.D.



FIRST THOUGHT—*Breast Milk*

SECOND THOUGHT—

Cow's Milk + Water + Dextri-Maltose

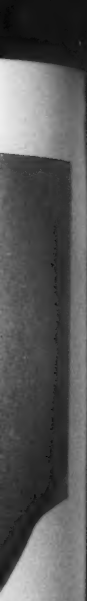
THE use of cow's milk, water and carbohydrate mixtures represents the one system of infant feeding that consistently, for three decades, has received universal pediatric recognition. No carbohydrate employed in this system of infant feeding enjoys so rich and enduring a background of authoritative clinical experience as Dextri-Maltose.

DEXTRI-MALTOSE No. 1 (with 2% sodium chloride), for normal babies.
DEXTRI-MALTOSE No. 2 (plain, salt free), permits salt modifications by the physician.
DEXTRI-MALTOSE No. 3 (with 3% potassium bicarbonate), for constipated babies.

These products are hypo-allergenic

MEAD JOHNSON & CO., Evansville, Indiana, U.S.A.

Please enclose professional card when requesting samples of Mead Johnson products to cooperate in preventing their reaching unauthorized persons



Elk

ose

s the
as re-
this
f au-

ian.

. A.
person

VI
VI
ME
ME
ME

a natural source of

VITAMIN B_1

VITAMIN G

and other known factors of the

VITAMIN B COMPLEX

including nicotinic acid

MEAD'S BREWERS YEAST TABLETS • Each Mead's Brewers Yeast Tablet contains 20 International units of vitamin B_1 (thiamin—the antineuritic factor) and 20 Sherman units of vitamin G (riboflavin). Clinical tests have shown the product to be rich also in nicotinic acid, for the prevention and treatment of pellagra. Supplied in 6-grain tablets in bottles of 250 and 1,000.

MEAD'S BREWERS YEAST POWDER • Each gram (½ teaspoon) supplies 50 International units of vitamin B_1 and 50 Sherman units of vitamin G (the same potency as Mead's Brewers Yeast Tablets), as well as nicotinic acid. Mixes readily with various vehicles the physician may specify in infant feeding. Supplied in 6-oz. bottles.

Mead's Brewers Yeast is nonviable and is vacuum-packed to prevent oxidation. Packed in brown bottles and sealed cartons for greater protection.

MEAD JOHNSON & COMPANY, EVANSVILLE, INDIANA, U. S. A.

Noah Webster might have written his definition of research with Parke-Davis in mind

Research is diligent, protracted investigation, especially for the purpose of adding to human knowledge.— *N. Webster*

Could the hundred and more research workers at the Parke-Davis Laboratories assemble around a great table to discuss the scope of medical research, they might talk in terms of those grueling jungle experiences, now a half century past, to seek out and add new drugs to the medical armamentarium. Or possibly their discussion would concern the brilliant work of wresting from the posterior lobe of the pituitary gland the secret of its two hormones. Or perhaps the protracted studies that led to the introduction of Meningococcus Antitoxin, which has reduced mortality from meningitis by more than half . . . all Parke-Davis research projects "for the purpose of adding to human knowledge."

As Webster defined research, so has Parke, Davis & Company followed through since those days in the early '70's when we inaugurated a definite program of pharmaceutical investigation so that "Medicine may make the life of the individual a longer and safer journey."

PARKE, DAVIS & COMPANY

Divisions of PARKE-DAVIS RESEARCH LABORATORIES: Pharmacy · Pharmacology · Botany · Organic Chemistry · Chemistry · Analytical Chemistry · Microanalytical Chemistry · Physical Chemistry · Biochemistry · Endocrinology · Physiology · Histology · Hematology · Allergy · Bacteriology · Pathology · Immunology · Serology